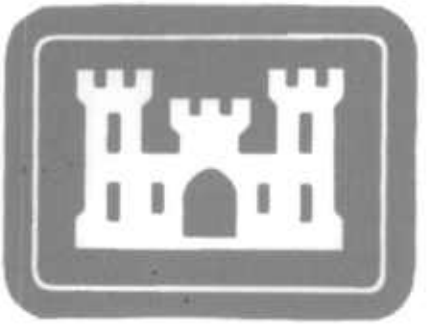
VALUE ENGINEERING STUDY REPORT

Operations Buildings
Poplar Island



Baltimore District
US Army Corps of Engineers

By:
Project Management Services, Inc.
PO Box 4113
Rockville, MD 20849-4113
301-340-0527

17 March 03

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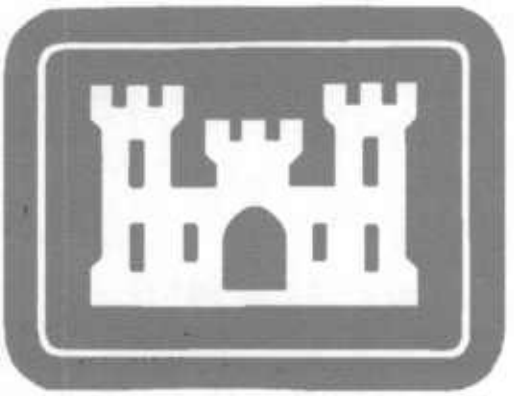
VALUE ENGINEERING STUDY REPORT

Operations Buildings
Poplar Island



Baltimore District
US Army Corps of Engineers

VE Team Members:

Benson Kwong, PE, CVS	Team Leader
James Freehof, AIA	Architect
George Gerber, PE	Civil/Structural Engineer
Monte Richards, PE	Electrical Engineer
Harry Dalal	Cost Estimator
John Vogel, PE, CVS	Value Engineer

17 March 2003

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VALUE ENGINEERING STUDY REPORT

OPERATIONS BUILDINGS
POPLAR ISLAND

Table of Contents

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VALUE ENGINEERING STUDY REPORT

OPERATIONS BUILDINGS
POPLAR ISLAND

Executive Summary

INTRODUCTION

This report contains the results of a value engineering (VE) study of the Operations, Maintenance and Storage Buildings at Poplar Island in Talbot County, Maryland. A site visit was made by the VE team on 3 March 03, and an information briefing was held on the morning of 6 March 03. The VE workshop continued after the briefing and was completed on 7 March 03.

The submittal drawings, design analyses and documents were developed by the US Army Corps of Engineers, Baltimore District.

Project Management Services, Inc. (PMSI) performed the VE study under contract to the Baltimore District. PMSI's principals and associates are experienced professionals who perform VE studies and cost estimates in all disciplines of the building industry. The VE team was comprised of a architect, a civil/structural engineer, an electrical engineer, a cost estimator, and a certified value specialist who is also a mechanical engineer,

PROJECT OVERVIEW

This project requires administrative and operational facilities for the Maryland Port Authority and the Maryland Environmental Service at Poplar Island, consisting of two structures - an operations building and a vehicle storage/maintenance building. The project is to be constructed in an uninhabited island.

The Operations Building will provide office space, a laboratory, conference rooms, a lunch room, a locker room, storage, and support spaces. The building will be a wood-framed structure with concrete slab-on-grade floors. Pre-cast concrete pavers will cover a portion of the first floor roof, providing a roof deck for the building. Sidewalks will provide access from the parking lot.

The Vehicle Storage/Maintenance Building will be prefabricated steel-framed structures that share an adjoining wall. The facility will provide an office, maintenance space for the maintenance vehicles, storage, vehicle bays, storage space for the maintenance vehicles, and support spaces. The buildings will have concrete slab-on-grade floors that will accommodate heavy-duty storage shelves and equipment. Sidewalks will provide access from the parking lot.

The estimated construction cost of the facility is $2,792,636. No design contingency or escalation has been included. See Proposal PM-01 for further comments on the cost estimates.

ISSUES AND OBJECTIVES

The VE team identified the following project goals:

- Showcase the island
- House operations
- Maintain vehicles
- Store vehicles and material

With these issues in mind, the VE team performed a function analysis of the project and analyzed the cost model (both included in the Appendices).

RESULTS

From the 71 ideas generated in the workshop, the VE team developed 14 VE proposals and five design suggestions. A number of the proposals are mutually exclusive. No attempt was made to establish the total potential cost savings at this time.

An alphanumeric listing of the VE proposals and design suggestions is available in the next section, "Summary of Proposals." More comprehensive and detailed information is in the individual proposals that follow the summary.

A majority of the proposals, across all disciplines, focus on the following main themes:

- Maximize pre-fabricated content to minimize less productive on-site labor.
- Minimize material transportation cost by reducing the weight and/or volume of building material.
- Eliminate systems that require special construction equipment or subcontractors.

The proposals are summarized below by discipline and functional needs. Unless otherwise stated, cost savings are initial cost savings.

ARCHITECTURAL

A reduction in the use of masonry, which is labor intensive and heavy to transport, would simplify construction.

Proposal:		Initial Cost Savings:
A-01	Use pre-fabricated panels in lieu of masonry veneer for the exterior of the Operations Building.	$102,980

A-17	Eliminate the double wall between the Vehicle Maintenance and Storage Buildings.	$38,292
A-36	Extend the metal siding and omit masonry at the Vehicle Maintenance and Storage Buildings.	$29,874

The precast concrete roof deck is another heavy element that can be simplified or reduced.

A-02	Use composite decking in lieu of precast concrete pavers at the deck of the Operations Building.	$44,648
A-03	Reduce the extent of observation deck area at the Operations Building.	$23,340

Other simplification of construction results in savings.

A-07	Reduce the height of the Storage Building.	$16,419
A-32	Reduce the default ceiling height to 8'-0".	$15,552
A-05	Provide a non-obscuring metal railing in lieu of masonry parapet at the Operations Building.	$10,841
A-08	Move the water treatment area to the Operations Building.	$10,721

The ultimate simplification for the Operations Building would be a more efficient single story building. The visitor viewing function can be accomplished by bus tour and video presentation. Not having a second story viewing deck should not diminish the visitors' experience on the island and would significantly reduce the project cost.

A-04	Use a single-story pre-engineered building for the Operations Building.	$671,105

ELECTRICAL

Proposal:		**Initial Cost Savings:**
E-04	Delete the CCTV security system.	$145,076
E-02	Install Romex cables in lieu of Metal Clad cables for the branch wiring.	$ 14,385

MECHANICAL

The ground source heat pump adds a major cost to the project since it involves drilling of wells and all the specialty equipment and labor that it entails. The system is not well utilized in this project as electric resistance still provides most of the heating needs for the buildings.

Proposal:		Initial Cost Savings:
M-02 Use electric heat and delete the ground source heat pump.		$ 72,741
	O&M savings:	$(19,553)
	Total:	$ 53,188
M-03 Use diesel fuel for heating and delete the ground source heat pump.		$ 24,973
	O&M savings:	$ (8,128)
	Total:	$ 16,845

DESIGN SUGGESTIONS

The following proposals offer suggestions for design. No cost savings were associated with these proposals.

A-30 Aim for SPiRiT Bronze Certification.

A-11 Recognize the need for a bridge crane in the Vehicle Maintenance Building.

E-01 Develop an electrical master plan.

C-01 Review the structural loads.

PM-01 Review the cost estimate for discrepancies.

CONCLUSION

The next step in the VE process is the implementation phase to be initiated at the formal presentation scheduled for 25 March 2003 at 9:30am in room 10220, CCB Baltimore. At that time, the decision will be made to accept the VE proposals in whole or in part, reject them with cause, or defer them for further study. The VE team looks forward to receiving your comments by noon 24 March 2003, and to having a productive implementation meeting.

VALUE ENGINEERING STUDY REPORT

OPERATIONS BUILDINGS
POPLAR ISLAND

Project Description[1]

BACKGROUND

Poplar Island, recently on the verge of extinction, is today a national model for habitat restoration and the beneficial use of dredged material. Just off the Chesapeake Bay coastline, about 34 miles south of Baltimore near Talbot County, Maryland., Poplar Island is being returned to its former size and important ecological function while helping to ensure the economic vitality of the region.

PROJECT DESCRIPTION

This project is required to provide administrative and operational facilities for the Maryland Port Authority and the Maryland Environmental Service on Poplar Island consisting of two structures, an operations building and a vehicle storage/maintenance building.

The Operations Building will provide office space, a laboratory, conference rooms, lunchroom, locker room, storage, and support spaces. The building will be a wood-framed structure with concrete slab-on-grade floors. Pre-cast concrete pavers will cover a portion of the first floor roof, providing a roof deck for the building. Sidewalks will provide access from the parking lot.

The Vehicle Storage/Maintenance Building will be prefabricated steel-framed structures that share an adjoining wall. The Vehicle Storage/Maintenance Building will provide an office, maintenance space for the maintenance vehicles, storage, vehicle bays, storage space for the maintenance vehicles, and support spaces. The buildings will have concrete slab-on-grade floors that will accommodate heavy-duty storage shelves and equipment. Sidewalks will provide access from the parking lot.

The area calculations for the current contract documents are as follows:

Operation Building	8,320 SF
Vehicle Storage/Maintenance Building	10,216 SF
Total Area for Facilities	18,536 SF

Finishes:

Operations Building – Brick will be the prominent exterior material, with three courses of precast concrete for accent. Wood studs back the face brick. The sloped portion of the roof will consist of a pre-finished standing seam metal roof. All materials, finish colors, and textures are designed to be compatible. Interior finishes will be conventional commercial or residential materials, which are readily available and replaceable; paint, vinyl wallcovering, carpet, vinyl floor tile, vinyl cove base, solid surfacing, ceramic tile, plastic laminate and lay-in acoustic ceiling tile (ACT).

[1] Adapted from the narratives for the USACE documents for the project.

Vehicle Storage/Maintenance Building – Insulated and non-insulated metal panels will be the prominent exterior material. The base of the building will be of brick and pre-cast concrete that match the Operations Building. The roof will consist of a sloped, prefinished standing seam roof. All materials, finish colors, and textures are designed to be compatible. Interior finishes will be conventional commercial or residential materials, which are readily available and replaceable: paint, vinyl floor tile, vinyl cove base, plastic laminate and lay-in acoustic ceiling tile (ACT).

Structural:

The Operations Building will be a two-story wood-framed structure with concrete slab-on-grade floor. The second floor roof will be comprised of wooden trusses and plywood sheathing. The second floor will be supported by wood I-joists with plywood sheathing. A wood walkway will cover a portion of the first floor roof, providing a roof deck for the building. Lateral loads will be resisted by wood shearwalls. The foundation will consist of spread footings.

The Vehicle Storage/Maintenance Buildings will be prefabricated steel-framed structures that share an adjoining wall. The Maintenance Building will have a concrete slab-on-grade floor. The Vehicle Storage Building will have a gravel floor to save costs. The foundations will consist of spread footings.

Electrical:

Primary Service: The area is serviced by 25kV underground electric lines. 3#1 AWG cables with concentric neutral 35kV with 133% EPR insulation rated for direct burial from the existing switch will feed the Government furnished 1000kVA, 25kV-120/208V, 3p transformer.

Exterior Lighting: Lights will be provided on the building for security.

Exterior Telephone: Fiberoptics is brought to the building from an existing telephone vault.

Lightning protection will be provided.

Lighting: Lighting in general shall consist of fluorescent fixtures with electronic ballast. In the bedrooms and corridors fixtures will be wall mounted. In the mechanical spaces industrial fluorescent fixtures will be used and in small space areas such as closets compact fluorescent fixtures will be used. Illumination levels will be in accordance with TI-800-01. LED exit lights will be used at all exit points and along egress paths as per NFPA. Emergency lights will be provided along all means of egress.

A CCTV camera will be provided.

A PA system will be connected to the phone system. The design will include paging from any phone to any other phone, or all the other phones and the exterior. Wall mounted loud speakers will be provided on the exterior wall to page anyone outside.

HVAC:

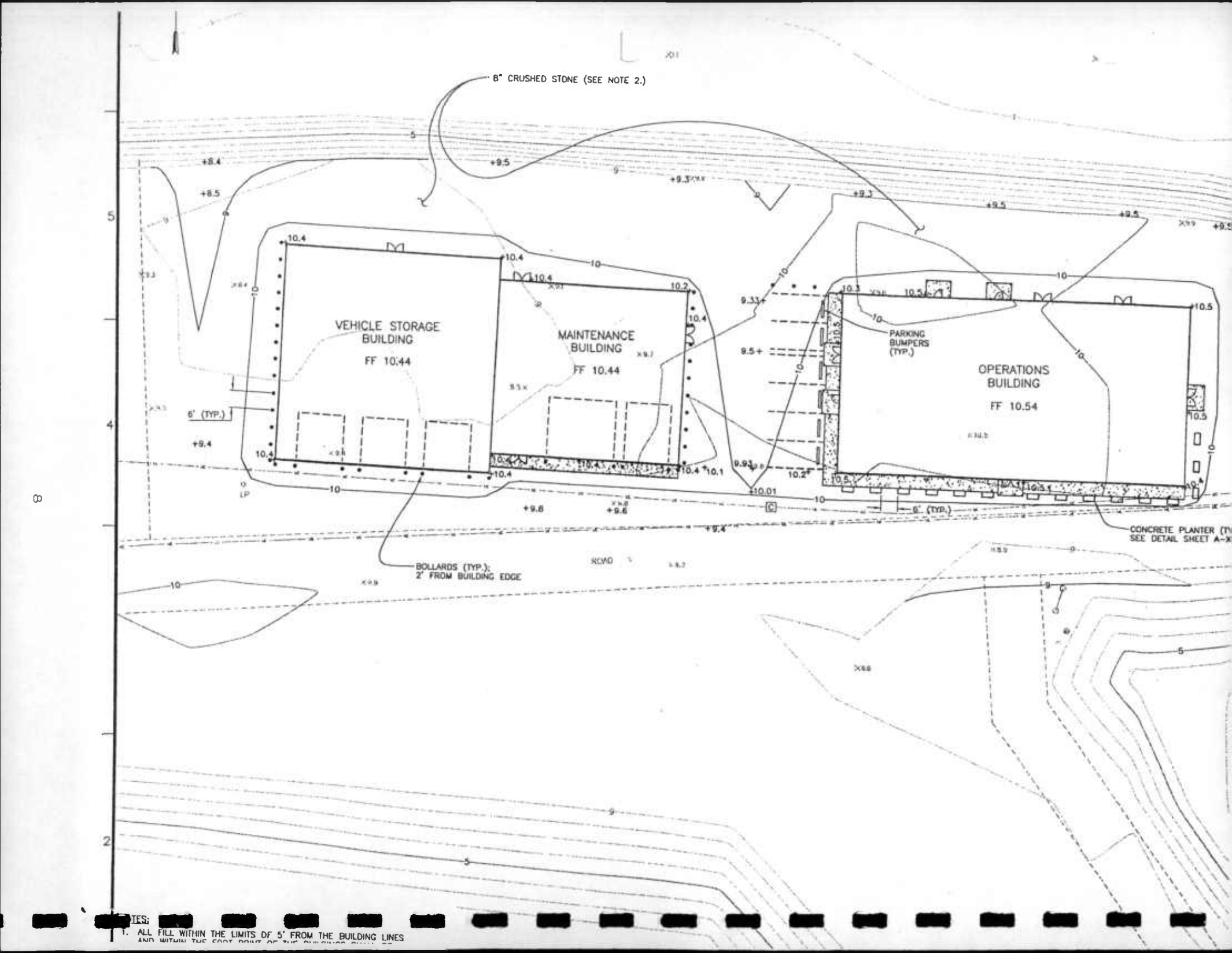
Air Systems: Space conditioning in the Administration/Operations Building will be accomplished using several water source heat pumps (WSHP). One WSHP will include variable airflow control and variable air volume (VAV) terminal boxes to serve most of the admin/office areas. The second floor conference room will have a dedicated constant volume (CV) WSHP. The Maintenance Building office will be

served by a small CV-WSHP. All WSHPs will be connected to a vertical ground-coupled heat exchange system. The earth will be used as both a heat sink and a heat source. Locker rooms, janitor closets and toilet rooms will be served by exhaust systems with make-up air being drawn from adjacent spaces. The maintenance bay area will include roof mounted general exhaust fans and an overhead vehicle tailpipe exhaust system. The control scheme shall be packaged DDC.

Fire Protection:

Fire Protection for the Administration Building and the Vehicle Storage/Maintenance Building shall consist of a fire alarm system and portable extinguishers. The fire alarm signals shall be transmitted via telephone line to a UL listed Central Station Service for relay to the local fire department.

The following pages show a site plan and a copy of the summary of the cost estimate.



NOTES:

1. ALL FILL WITHIN THE LIMITS OF 5' FROM THE BUILDING LINES AND WITHIN THE FOOT PRINT OF THE BUILDINGS SHALL BE

** PROJECT DIRECT SUMMARY - Facility **

	QUANTITY	UOM	MANHRS	LABOR	EQUIPMNT	MATERIAL	OTHER	TOTAL COST	UNIT COST
A_ Primary Facilities									
A_.01 Operations Building	10400.00	SF	12,257	551,048	12,607	853,797	0	1,417,452	136.29
A_.02 Vehicle Storage/Maintenance Bldg	10165.00	SF	4,298	173,061	20,779	364,348	0	558,188	54.91
TOTAL Primary Facilities	1.00	EA	16,555	724,109	33,386	1218146	0	1,975,640	1975640
B_ Supporting Facilities									
B_.17 Site Preparation	1.00	AC	82	2,477	1,556	0	0	4,033	4033.26
B_.18 Site Improvements	1.00	SY	347	9,722	2,929	56,538	0	69,189	69188.59
B_.19 Site Civil/Mechanical Utilities	1.00	EA	599	25,064	2,366	43,863	3,111	74,403	74402.94
B_.20 Site Electrical Utilities	1.00	EA	369	16,589	6,879	14,966	0	38,434	38434.27
TOTAL Supporting Facilities	1.00	EA	1,397	53,852	13,730	115,367	3,111	186,059	186059.06
H_ Design Cost									
TOTAL Administration Building	1.00	EA	17,952	777,961	47,115	1333513	3,111	2,161,699	2161699
Contractor's Overhead								302,638	
SUBTOTAL								2,464,337	
Home Office Expense								49,287	
SUBTOTAL								2,513,624	
Contractor's Profit								251,362	
SUBTOTAL								2,764,986	
Contractor's Bond								27,650	
TOTAL INCL INDIRECTS								2,792,636	

VALUE ENGINEERING STUDY

SUMMARY OF PROPOSALS

Numbe	*Proposal*	*Initial Savings*	*O / M Savings*	*Total Savings*
A-01	Use pre-fabricated panels in lieu of masonry veneer for the exterior of the Operations Building.	$102,980		$102,980
A-02	Use composite decking in lieu of precast concrete pavers at the deck of the Operations Building.	$44,648		$44,648
A-03	Reduce extent of observation deck area at Operations Building.	$23,340		$23,340
A-04	Use a single-story pre-engineered building for the Operations Building.	$671,105		$671,105
A-05	Provide non-obscuring metal railing in lieu of masonry parapet at the Operations Building.	$10,841		$10,841
A-07	Reduce height of the storage building.	$16,419		$16,419
A-08	Move water treatment area to Operations Building.	$10,721		$10,721
A-11	Recognize need for bridge crane in vehicle maintenance building.		Design Suggestion	
A-17	Eliminate double wall between vehicle maintenance and storage buildings.	$38,292		$38,292
A-30	Aim for SPiRiT Bronze Certification.		Design Suggestion	
A-32	Reduce default ceiling height to 8'-0".	$15,552		$15,552
A-36	Extend metal siding and omit masonry at the Vehicle Maintenance and Storage Buildings.	$29,874		$29,874
C-01	Review structural loads.		Design Suggestion	
E-01	Develop an electrical master plan.		Design Suggestion	

VALUE ENGINEERING STUDY

SUMMARY OF PROPOSALS

Numbe	*Proposal*	*Initial Savings*	*O / M Savings*	*Total Savings*
E -02	Use Romex cables in lieu of Metal Clad cables for branch wiring.	$14,385		$14,385
E -04	Delete the CCTV System	$145,076		$145,076
M -02	Use electric heat. Delete ground source heat pump.	$72,741	($19,553)	$53,188
M -03	Use diesel fuel for heating. Delete ground source heat pump.	$24,973	($8,128)	$16,845
PM -01	Cost Estimate Comments			
			Design Suggestion	

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VALUE ENGINEERING PROPOSAL

PROJECT TITLE: Operations Buildings

PROJECT LOCATION: Poplar Island

PROPOSAL NO: A-01

DESCRIPTION:	Use pre-fabricated panels in lieu of masonry veneer for the exterior of the Operations Building.
CRITERIA CHALLENGE	No
FUNCTION:	Enclose Building
ORIGINAL DESIGN:	The exterior of the Operations Building is clad with masonry veneers (brick, split-face block and precast concrete).
PROPOSED DESIGN:	Use pre-fabricated metal panels in lieu of masonry veneers. Install shaped sheet metal and screening at base to control rodents.
ADVANTAGES:	* Simplifies construction. * Accelerates erection. * Reduces on-site labor. * Simplifies transportation of materials. * Exterior materials and appearance will be compatible with adjacent storage and Vehicle Maintenance Buildings. * Reduces load on structure. * Eliminates steel beams, steel columns and their footings needed for support of veneer at second floor. * Reduces cost.
DISADVANTAGES:	* Different Aesthetics.
JUSTIFICATION:	The primary purpose for using masonry veneer, as presented during briefings, was to keep rodents (mice) out of the building. The proposed use of pre-fab metal panels with shaped sheet metal/screening at the base will accomplish the rodent control while allowing the benefits listed under "advantages". A labor factor is added to the cost estimate to account for the productivity reduction for on-site masonry labor.

Initial Savings: $102,980

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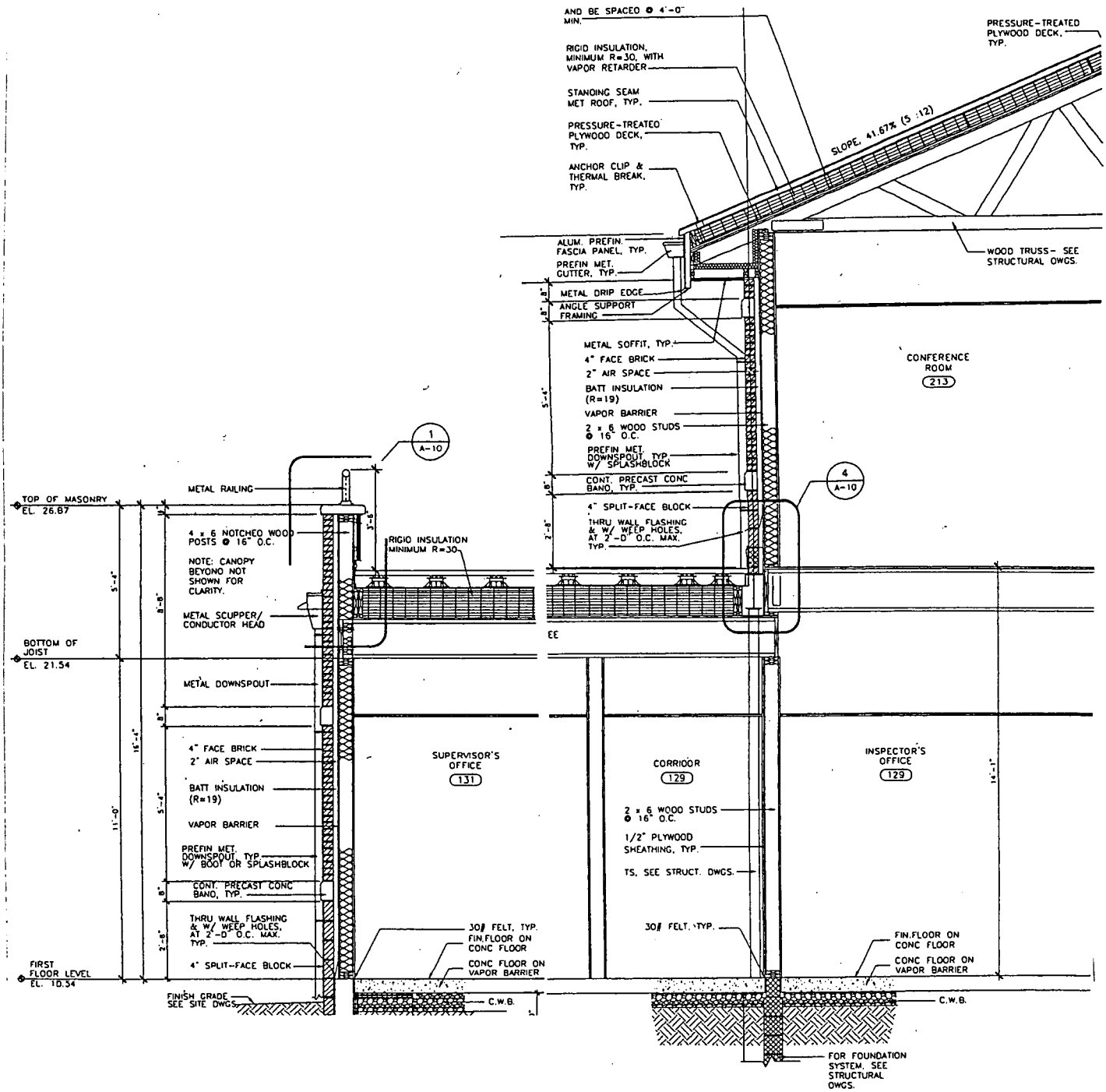
VALUE ENGINEERING PROPOSAL

ORIGINAL SKETCH A - 01



2 WALL SECTION
SCALE: 1/2" = 1'-0"

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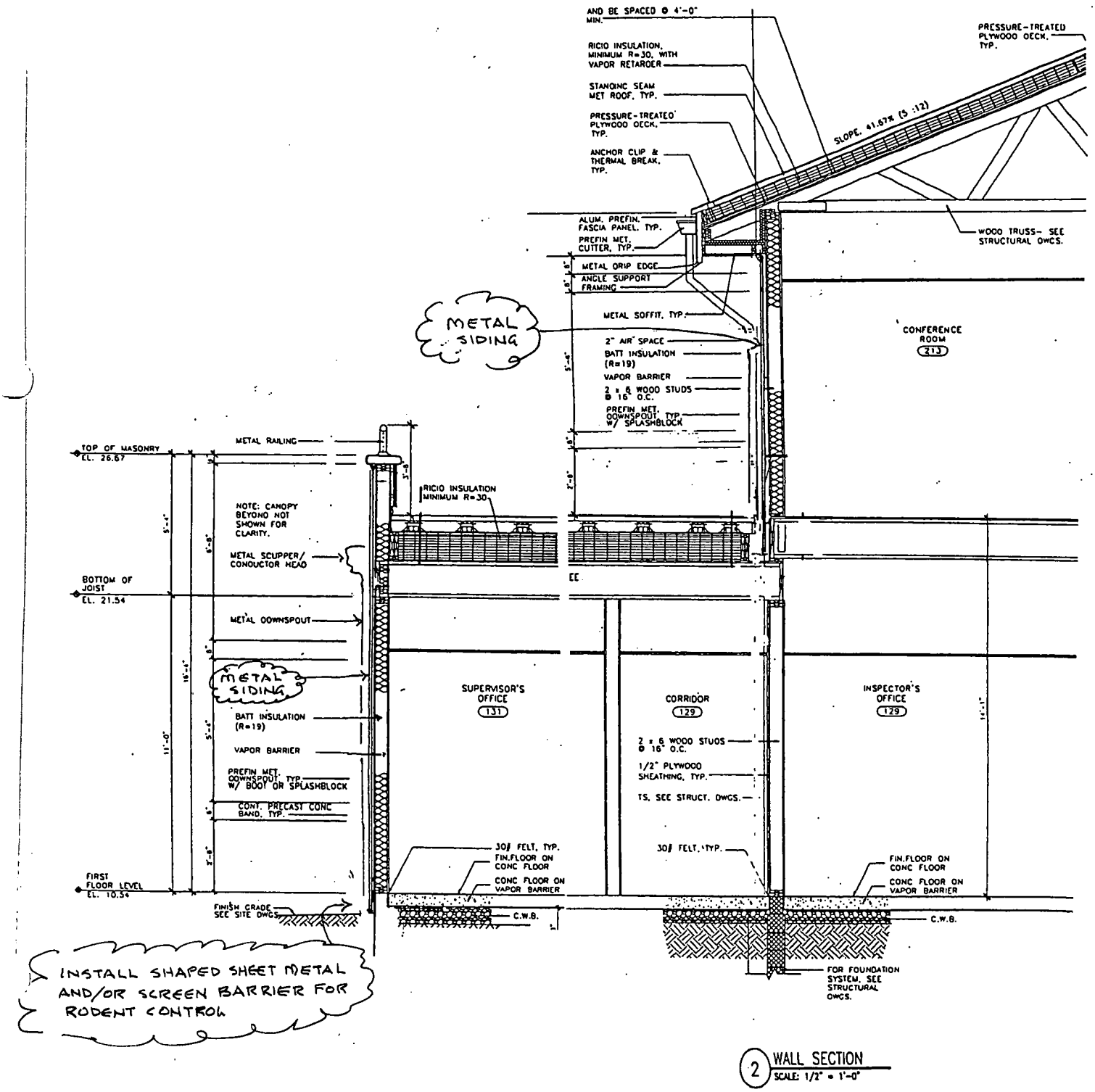
PROPOSED CHANGE A - 01



2 WALL SECTION
SCALE: 1/2" = 1'-0"

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VALUE ENGINEERING PROPOSAL

COST ESTIMATING WORKSHEET

A - 01

Item	*Quantity*	*Unit*	*Unit Cost*	*Cost*	*Cost w/ Mark-Up*	*Source Code**
Original						
Concrete column footing with excavation	6	CY	$290.00	$1,740	$2,409	4
Steel columns and beams	6.5	TN	$2,025.00	$13,163	$18,225	3
Brick veneer	8051	SF	$8.86	$71,332	$98,766	1
Productivity adjustment for brick	8051	SF	$1.50	$12,077	$16,721	4
PC. Conc. Bands	880	LF	$10.50	$9,240	$12,794	4
PC. Conc. Coping	380	LF	$22.54	$8,565	$11,859	1
			Total:		$160,774	
Proposed						
Prefab metal wall panel/siding	8051	SF	$4.98	$40,094	$55,514	3
Shaped sheet metal/screen closure	610	LF	$2.70	$1,647	$2,280	3
			Total:		$57,795	
			Initial Cost Savings:		$102,980	

Default mark-up Rate 38.46%

** Source Code 1. Project Cost Estimate 2. MCACES Data Base 3. R.S. Means 4. Other - VE Team*

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VALUE ENGINEERING PROPOSAL

PROJECT TITLE: Operations Buildings

PROJECT LOCATION: Poplar Island

PROPOSAL NO: A - 02

DESCRIPTION:	Use composite decking in lieu of precast concrete pavers at the deck of the Operations Building.
CRITERIA CHALLENGE	No
FUNCTION:	Surface Roof Deck
ORIGINAL DESIGN:	The roof above the lower level of the Operations Building is covered with concrete pavers set on raised pedestals. The pavers allow for observers to walk around the deck surface without damaging the roofing membrane. The pavers are shown as 24" x 24" x 4".
PROPOSED DESIGN:	Use composite decking set on composite sleepers that bear on bituminous pads placed on the roofing membrane. The decking may be pre-assembled into pallets so as to reduce the extent of on-site labor.
ADVANTAGES:	* Reduces the dead load on the roof structure over the lower level. * Reduces size of structure members. * Reduces on-site labor. * Reduces shipping and handling. * Reduces cost. * The bituminous pads beneath composite decking sleepers will provide better protection for the roofing membrane.
DISADVANTAGES:	* None apparent.
JUSTIFICATION:	The proposed composite decking assembly will serve the same function as the original design concrete pavers. There will be less potential for damage to roofing membrane and less load on the building. The composite material is durable and does not require any finished application.

Initial Savings: $44,648

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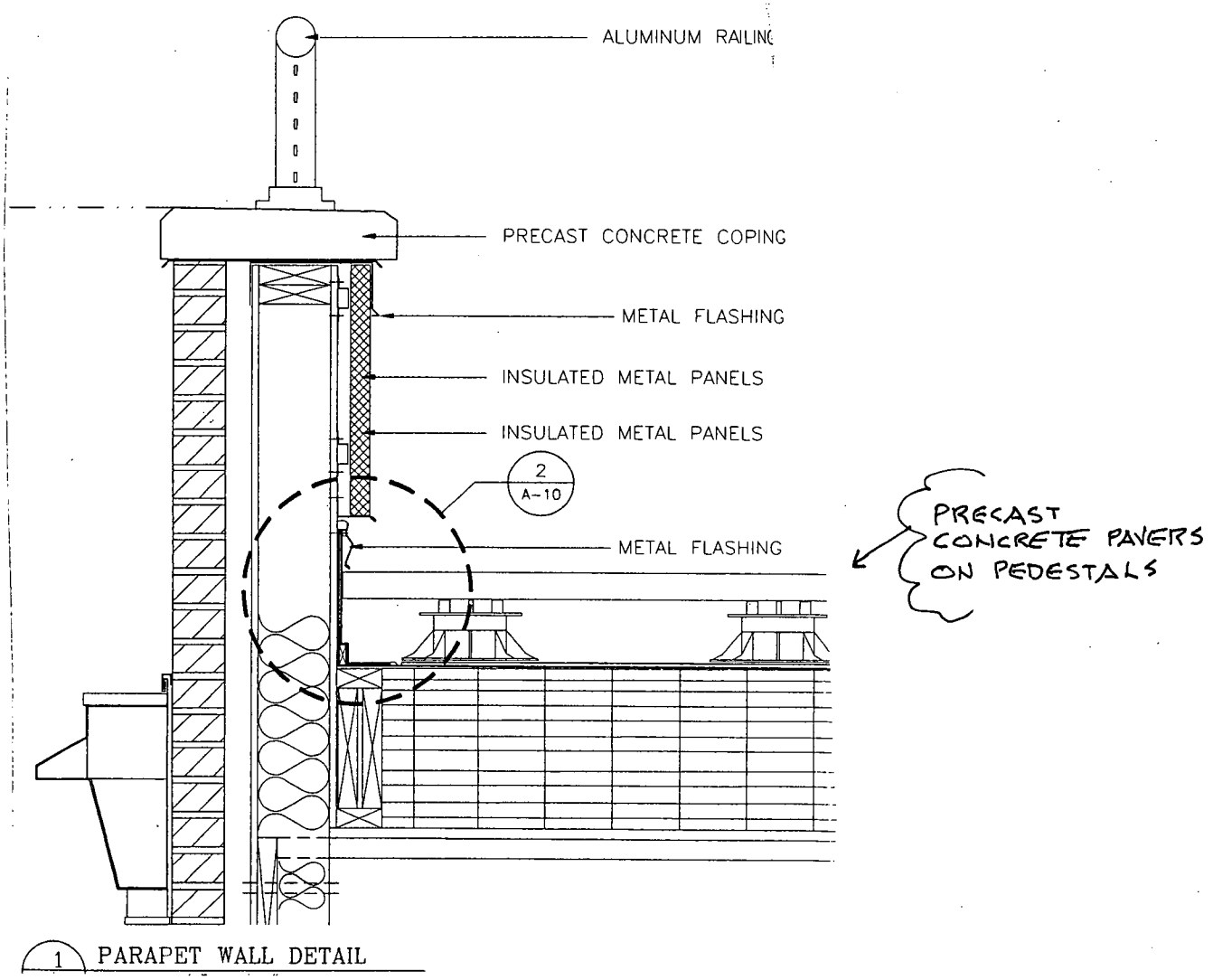
VALUE ENGINEERING PROPOSAL

ORIGINAL SKETCH A - 02



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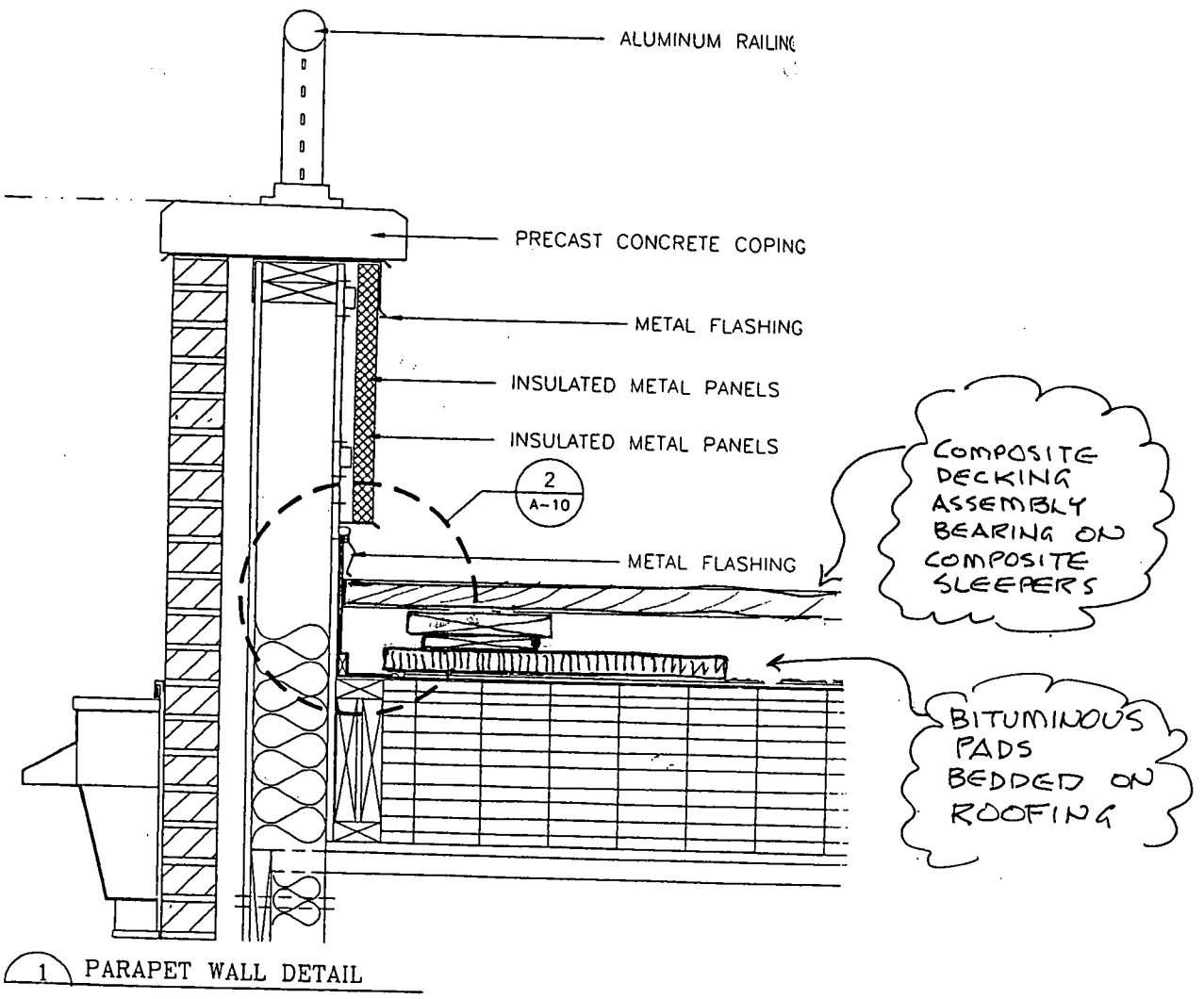
VALUE ENGINEERING PROPOSAL

PROPOSED CHANGE A - 02



1 PARAPET WALL DETAIL

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VALUE ENGINEERING PROPOSAL

COST ESTIMATING WORKSHEET

A - 02

Item	*Quantity*	*Unit*	*Unit Cost*	*Cost*	*Cost w/ Mark-Up*	*Source Code**
Original						
Precast concrete roof pavers	4712	SF	$8.23	$38,780	$53,694	1
Paver Pedestals	4712	SF	$3.33	$15,691	$21,726	1
Pedestal Shims	4712	SF	$1.15	$5,419	$7,503	1
Reduced dead load saving on roof structure, structural frame & foundation	0.08	LS	$43,200.00	$3,456	$4,785	4
			Total:		$87,708	
Proposed						
Composite sleepers	4712	SF	$1.50	$7,068	$9,786	4
Bituminous pads	4712	SF	$0.60	$2,827	$3,915	4
Composite roof deck	4712	SF	$4.50	$21,204	$29,359	4
			Total:		$43,060	
			Initial Cost Savings:		$44,648	

Default mark-up Rate 38.46%

** Source Code 1. Project Cost Estimate 2. MCACES Data Base 3. R.S. Means 4. Other - VE Team*

VALUE ENGINEERING PROPOSAL

PROJECT TITLE: Operations Buildings

PROJECT LOCATION: Poplar Island

PROPOSAL NO: A-03

DESCRIPTION:	Reduce extent of observation deck area at Operations Building.
CRITERIA CHALLENGE	No
FUNCTION:	Surface Roof Deck
ORIGINAL DESIGN:	The entire surface of the roof above the lower level of the Operations Building is covered with precast concrete pavers, used as an observation deck.
PROPOSED DESIGN:	Reduce extent of observation deck pavers by omitting pavers from those areas where viewing is not involved.
ADVANTAGES:	* Reduces extent of work. * Reduces load on structure. * Reduces cost. * Eliminates conflicts of roof exhaust with observation area.
DISADVANTAGES:	* None apparent.
JUSTIFICATION:	Views from the roof top are restricted in some directions due to topography and/or interference caused by the storage/maintenance buildings. In some areas, the exhaust from toilets, kitchen, and fume hood may interfere with public access. Accordingly, segments of the roof area will not serve as an observation space. Pavers at those areas may be omitted except for the extent required for circulation. (Exact location of omitted areas to be determined by users.)

Initial Savings: $23,340

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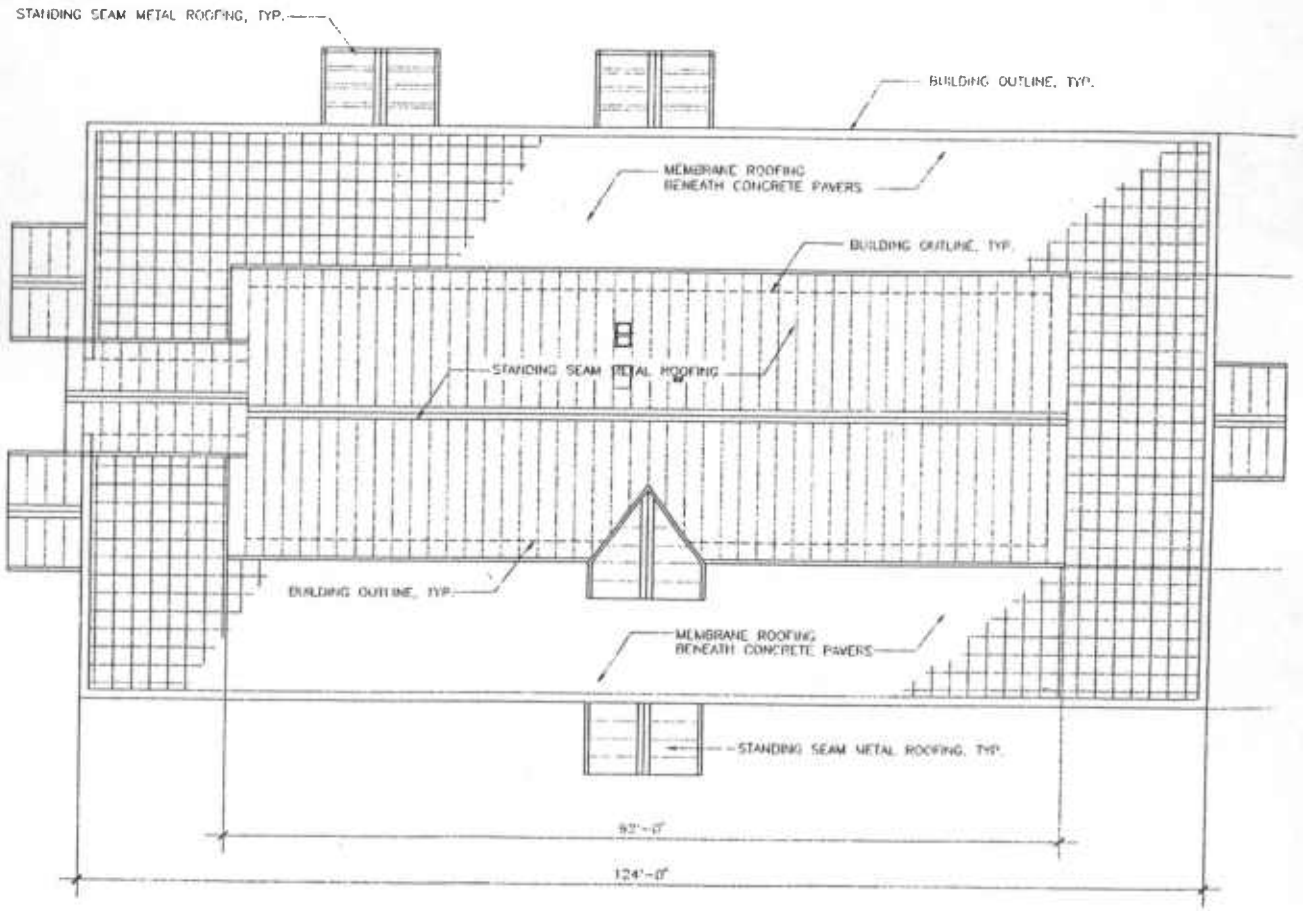
VALUE ENGINEERING PROPOSAL

ORIGINAL SKETCH A - 03



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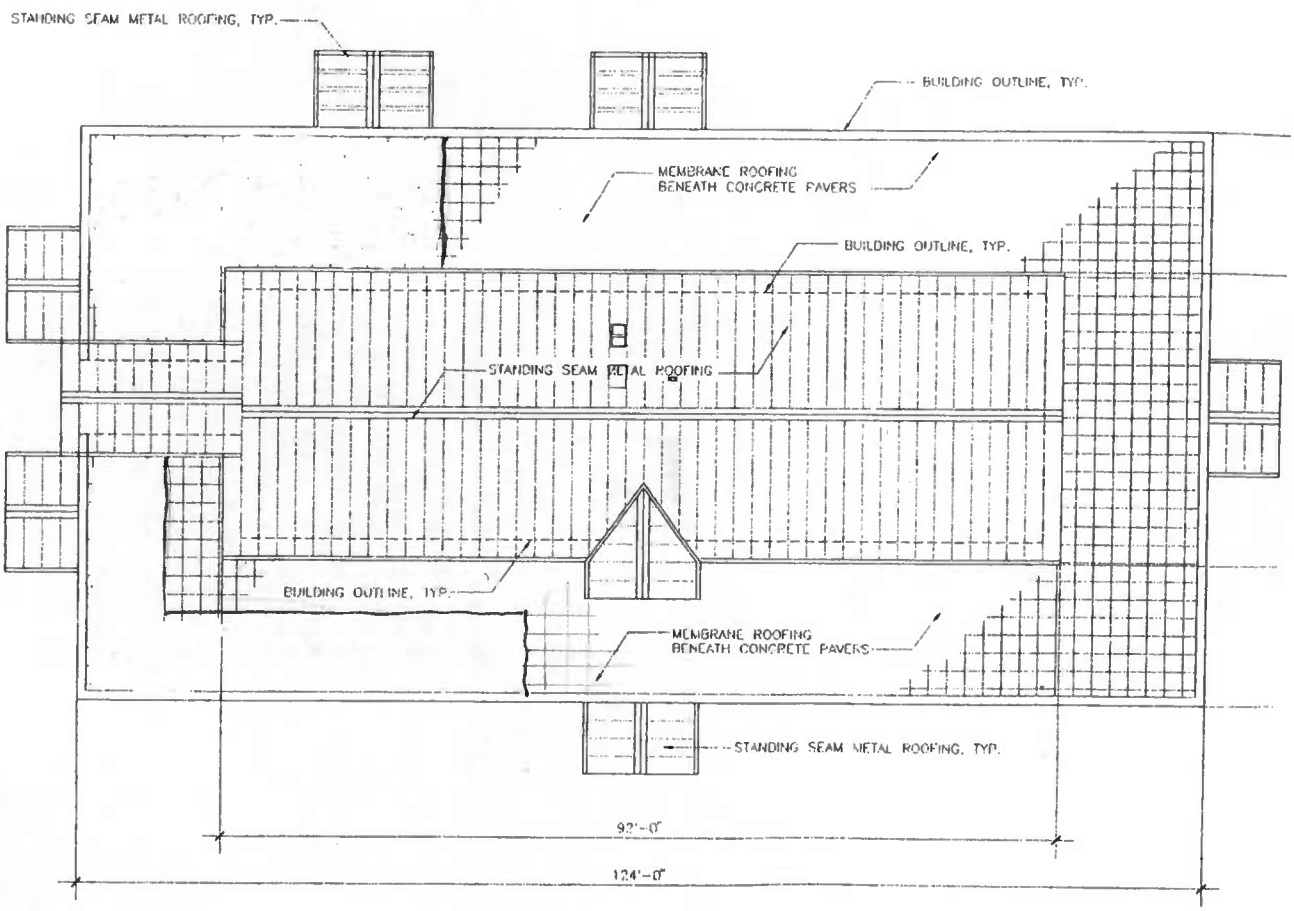
VALUE ENGINEERING PROPOSAL

PROPOSED CHANGE A - 03



VALUE ENGINEERING PROPOSAL

COST ESTIMATING WORKSHEET

A - 03

Item	*Quantity*	*Unit*	*Unit Cost*	*Cost*	*Cost w/ Mark-Up*	*Source Code**
Original						
Precast concrete roof pavers w/ pedestals & shims	4712	SF	$12.72	$59,937	$82,988	1
Reduced dead load saving on roof structure, structural frame & foundation	0.08	LS	$18,000.00	$1,440	$1,994	4
			Total:		$84,982	
Proposed						
Precast concrete roof pavers w/ pedestals & shims	3500	SF	$12.72	$44,520	$61,642	1
			Total:		$61,642	
			Initial Cost Savings:		$23,340	

Default mark-up Rate 38.46%

** Source Code 1. Project Cost Estimate 2. MCACES Data Base 3. R.S. Means 4. Other - VE Team*

VALUE ENGINEERING PROPOSAL

PROJECT TITLE: Operations Buildings

PROJECT LOCATION: Poplar Island

PROPOSAL NO: A - 04

DESCRIPTION: Use a single-story pre-engineered building for the Operations Building.

CRITERIA CHALLENGE No

FUNCTION: House Operations

ORIGINAL DESIGN: Current design includes second floor offices, toilets, kitchenette, conference room and an observation deck.

PROPOSED DESIGN: Relocate the second floor functions to the ground floor level. Reduce total building size and use a pre-engineered building.

ADVANTAGES:

* Reduces construction and operating costs.
* Eliminates elevator and stairs requirements.
* The integrity of the Operations Building roof can be readily maintained.

DISADVANTAGES:

* Different aesthetics.
* No second floor observation deck.

JUSTIFICATION: The existing two-story design introduces costs with little benefits. The inclusion of a rooftop observation deck could result in a premature loss of the roofing membrane integrity.

The rooftop observation deck requires the construction of second floor toilets and the installation of a personnel elevator to accommodate physically-challenged visitors.

A total square footage of a single story building can be reduced by approximately 10% due to the following factors:

1. No elevator or stairs requirement.
2. Restroom facilities can be combined.
3. The two conference rooms can be combined with an operable partition. The existing conference room in the trailer can be retained to serve as a backup facility.

Since the visitors will be taken around the island by bus and will

have ample opportunity to view the island from various vantage points, the observation deck is of little additional value. The development of detailed videos to depict island environmental functions can be very informative and can be tailored to suit the age and level of technical expertise of the visitors.

A double-deck bus can provide the same function of an elevated viewing position without the construction cost premium.

Initial Savings: $671,105

VALUE ENGINEERING PROPOSAL

COST ESTIMATING WORKSHEET

A - 04

Item	*Quantity*	*Unit*	*Unit Cost*	*Cost*	*Cost w/ Mark-Up*	*Source Code**
Original						
Operations Building	10400	SF	$136.29	$1,417,416	$1,962,554	1
			Total:		$1,962,554	
Proposed						
Foundation and slab on grade for pre-fab building	9360	SF	$9.65	$90,324	$125,063	4
Pre-engineered building	9360	SF	$30.00	$280,800	$388,796	4
Building fit-up work	9360	SF	$60.00	$561,600	$777,591	4
			Total:		$1,291,450	
			Initial Cost Savings:		$671,105	

Default mark-up Rate 38.46%

** Source Code 1. Project Cost Estimate 2. MCACES Data Base 3. R.S. Means 4. Other - VE Team*

VALUE ENGINEERING PROPOSAL

PROJECT TITLE: Operations Buildings

PROJECT LOCATION: Poplar Island

PROPOSAL NO: A-05

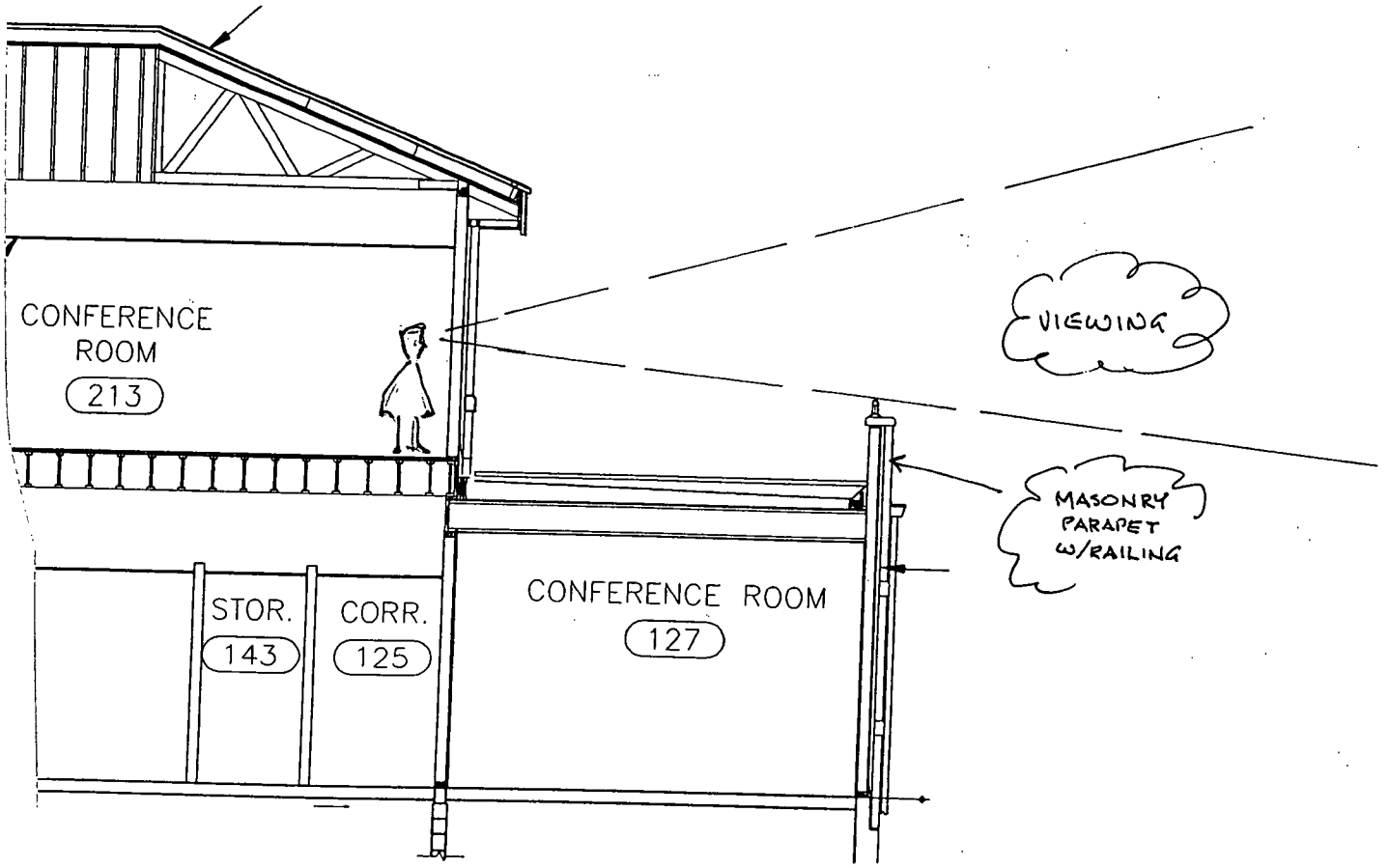
DESCRIPTION:	Provide non-obscuring metal railing in lieu of masonry parapet at the Operations Building.
CRITERIA CHALLENGE	No
FUNCTION:	Prevent Fall
ORIGINAL DESIGN:	The perimeter of lower level roof of the Operations Building has a masonry parapet with metal railing, surrounding the observation deck.
PROPOSED DESIGN:	Provide a metal railing, designed for minimal visual obstruction at full perimeter of lower level roof, in lieu of the masonry parapet.
ADVANTAGES:	* Allows significantly expanded viewing from the windows of the second level conference room. * Reduces cost.
DISADVANTAGES:	* Aesthetic change.
JUSTIFICATION:	Per the design briefing, the primary purpose of locating the large conference room at the second floor level is to provide visitors with views of the island restoration project. Since visitors will have access to the observation deck, a perimeter railing is essential. Providing a "transparent" railing rather than opaque (masonry) parapet will significantly expand the viewing area from windows of the conference room. There will also be some cost reduction.

Initial Savings: $10,841

PMSI

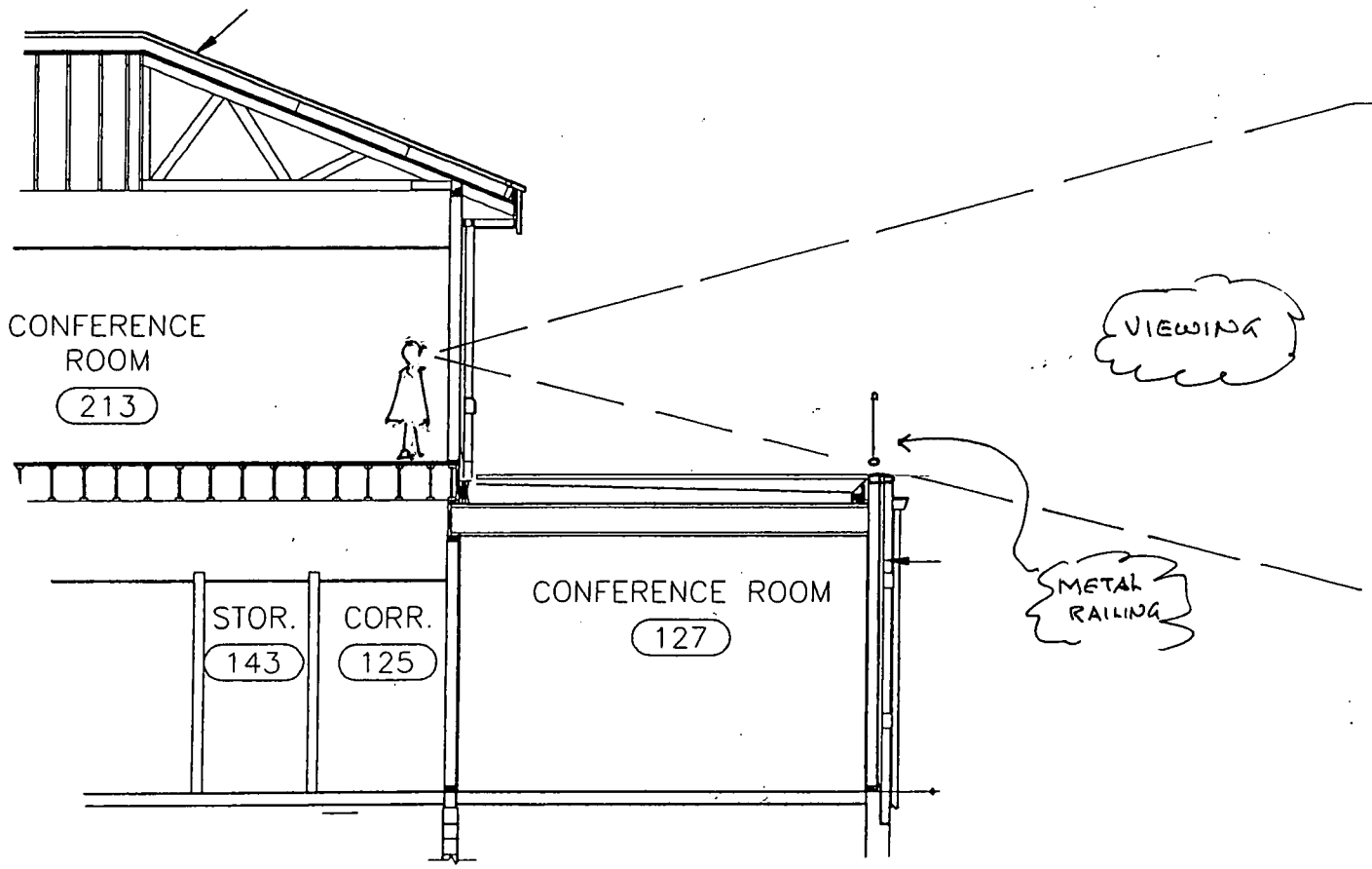
VALUE ENGINEERING PROPOSAL

ORIGINAL SKETCH A - 05



VALUE ENGINEERING PROPOSAL

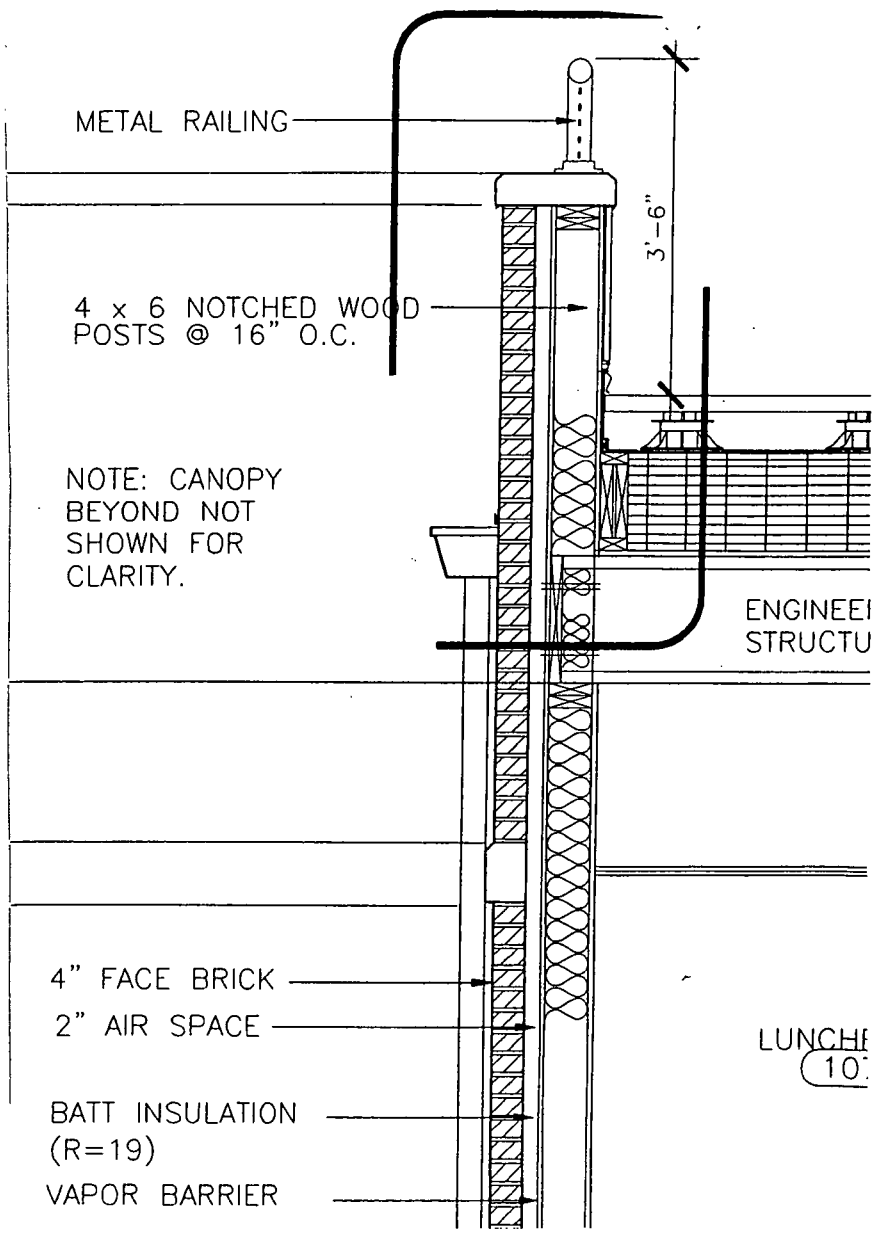
PROPOSED CHANGE A - 05



PMSI

VALUE ENGINEERING PROPOSAL

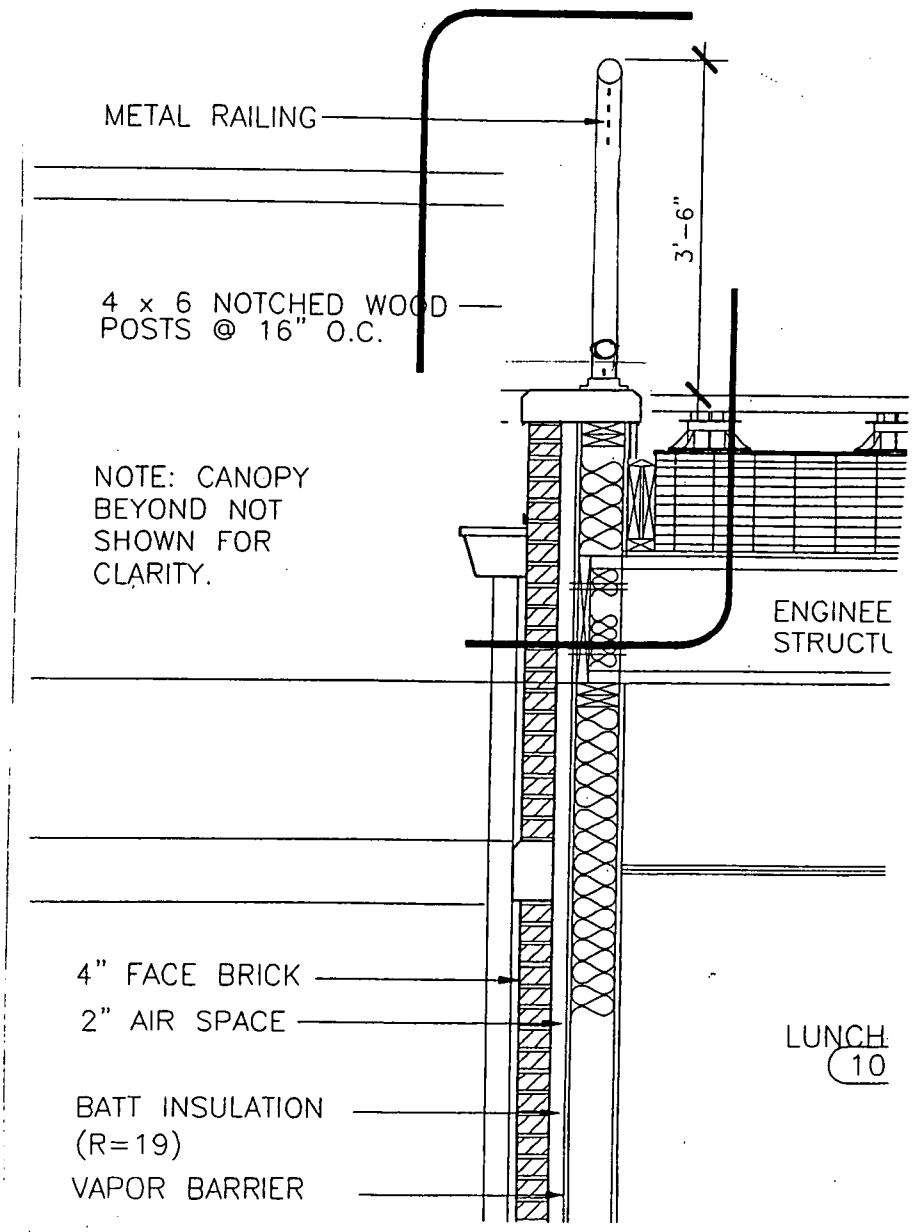
ORIGINAL SKETCH A - 05



PMSI

VALUE ENGINEERING PROPOSAL

PROPOSED CHANGE A - 05



PMSI

VALUE ENGINEERING PROPOSAL

COST ESTIMATING WORKSHEET

A - 05

Item	*Quantity*	*Unit*	*Unit Cost*	*Cost*	*Cost w/ Mark-Up*	*Source Code**
Original						
Brick veneer parapet wall with wood frame backing	900	SF	$14.70	$13,230	$18,318	4
Metal handrail	360	LF	$15.00	$5,400	$7,477	4
			Total:		$25,795	
Proposed						
Metal guardrail	360	LF	$30.00	$10,800	$14,954	3
			Total:		$14,954	
			Initial Cost Savings:		$10,841	

Default mark-up Rate 38.46%

** Source Code 1. Project Cost Estimate 2. MCACES Data Base 3. R.S. Means 4. Other - VE Team*

VALUE ENGINEERING PROPOSAL

PROJECT TITLE: Operations Buildings

PROJECT LOCATION: Poplar Island

PROPOSAL NO: A-07

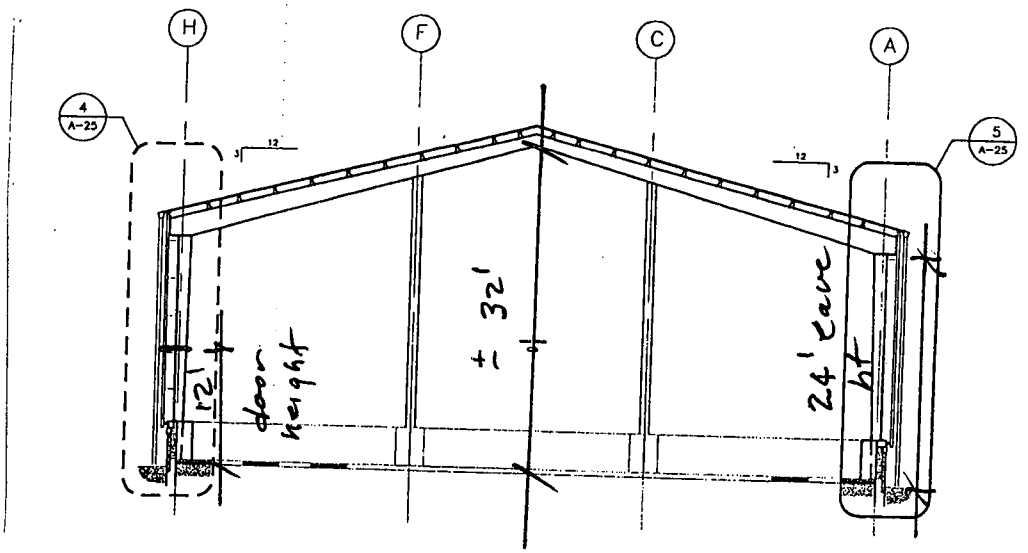
DESCRIPTION:	Reduce height of the storage building.
CRITERIA CHALLENGE	No
FUNCTION:	Store Material
ORIGINAL DESIGN:	The eave height of the pre-engineered steel structure for storage is 24 feet. Center height is approximately 32 feet. The roll up doors are 12 feet high.
PROPOSED DESIGN:	Use eave height of 16 feet with 3:12 roof slope. Keep 12 foot high roll up doors.
ADVANTAGES:	* Less cost.
DISADVANTAGES:	* Slightly less storage volume.
JUSTIFICATION:	This structure is to be used for storage of small boats, hovercraft, equipment and palletized materials. It is anticipated that a fork lift type vehicle would be utilized for stacking the pallets. It would appear that the upper volume of a higher structure would be little used or not at all.

Initial Savings: $16,419

PMSI

VALUE ENGINEERING PROPOSAL

ORIGINAL SKETCH A - 07

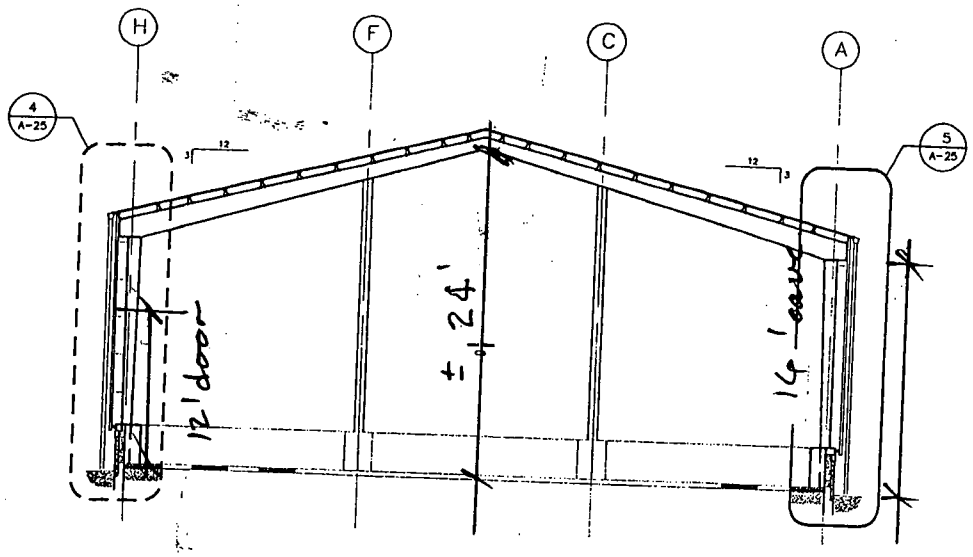


BUILDING SECTION

PMSI

VALUE ENGINEERING PROPOSAL

PROPOSED CHANGE A - 07



BUILDING SECTION

VALUE ENGINEERING PROPOSAL

COST ESTIMATING WORKSHEET

A - 07

Item	*Quantity*	*Unit*	*Unit Cost*	*Cost*	*Cost w/ Mark-Up*	*Source Code**
Original						
Pre-engineered building, 24' eave, 3:12 roof	5929	SF	$11.35	$67,294	$93,175	1
			Total:		$93,175	
Proposed						
Pre-engineered building, 16' eave, 3:12 roof	5929	SF	$9.35	$55,436	$76,757	4
			Total:		$76,757	
			Initial Cost Savings:		$16,419	

Default mark-up Rate 38.46%

** Source Code 1. Project Cost Estimate 2. MCACES Data Base 3. R.S. Means 4. Other - VE Team*

PMSI

VALUE ENGINEERING PROPOSAL

PROJECT TITLE: Operations Buildings

PROJECT LOCATION: Poplar Island

PROPOSAL NO: A-08

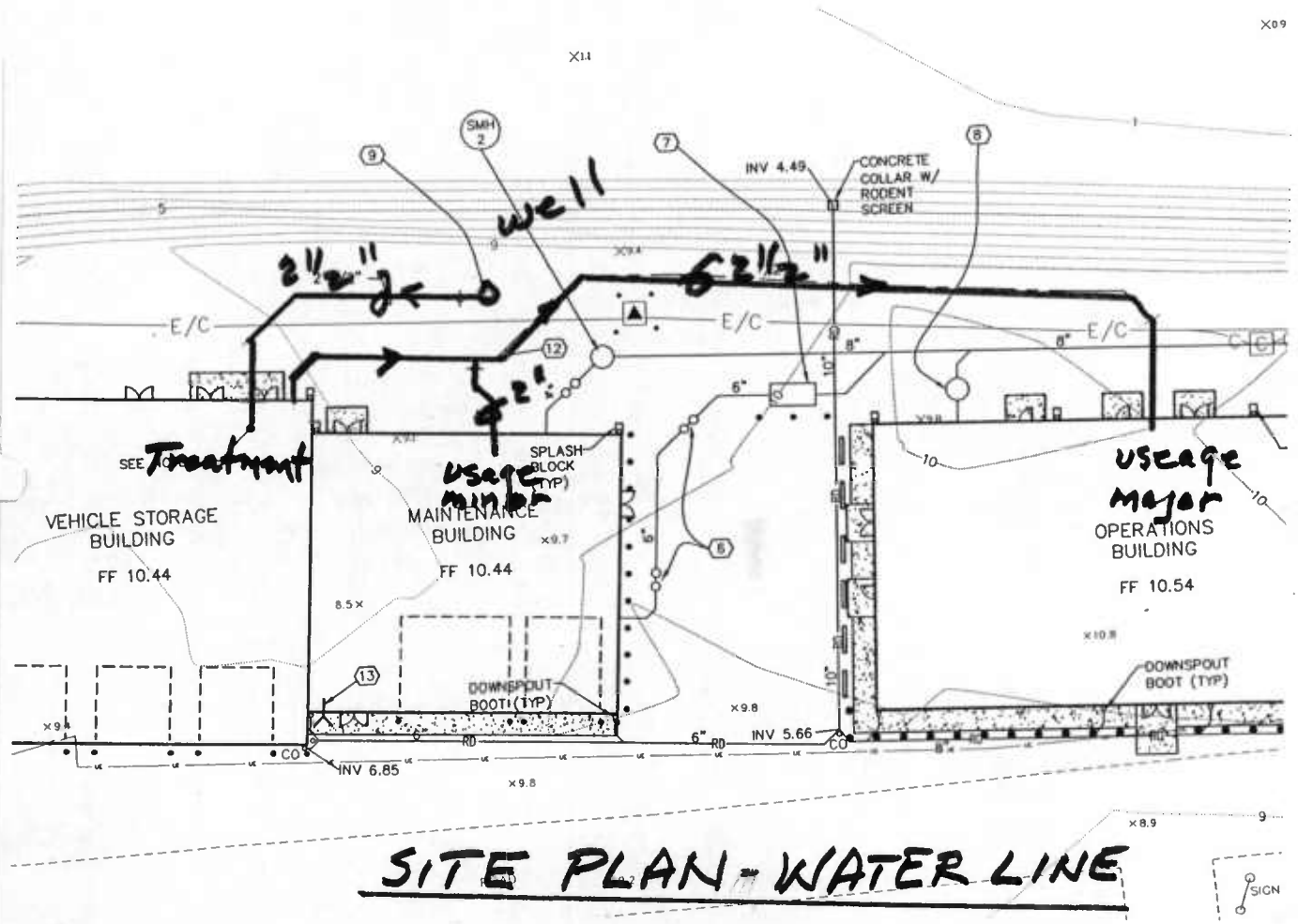
DESCRIPTION:	Move water treatment area to Operations Building.
CRITERIA CHALLENGE	No
FUNCTION:	Soften/Chlorinate Water
ORIGINAL DESIGN:	The well water treatment area is located in the unheated storage building. Primary usage point is the Operations Building.
PROPOSED DESIGN:	Locate the water treatment area as part of an expanded mechanical room in the Operations Building.
ADVANTAGES:	* Less piping. * Less space to heat.
DISADVANTAGES:	* None apparent.
JUSTIFICATION:	The water well is located behind the vehicle maintenance building. Untreated water under the original design is pumped west to the treatment area in the storage building, thence treated water is pumped east to the main usage point, the Operations Building. Under this proposal, the treatment area is located at the Operations Building which is also the main usage point. The two toilets and lavatories in the Vehicle Maintenance Building will use untreated water.

Initial Savings: $10,721

PMSI

VALUE ENGINEERING PROPOSAL

ORIGINAL SKETCH A - 08

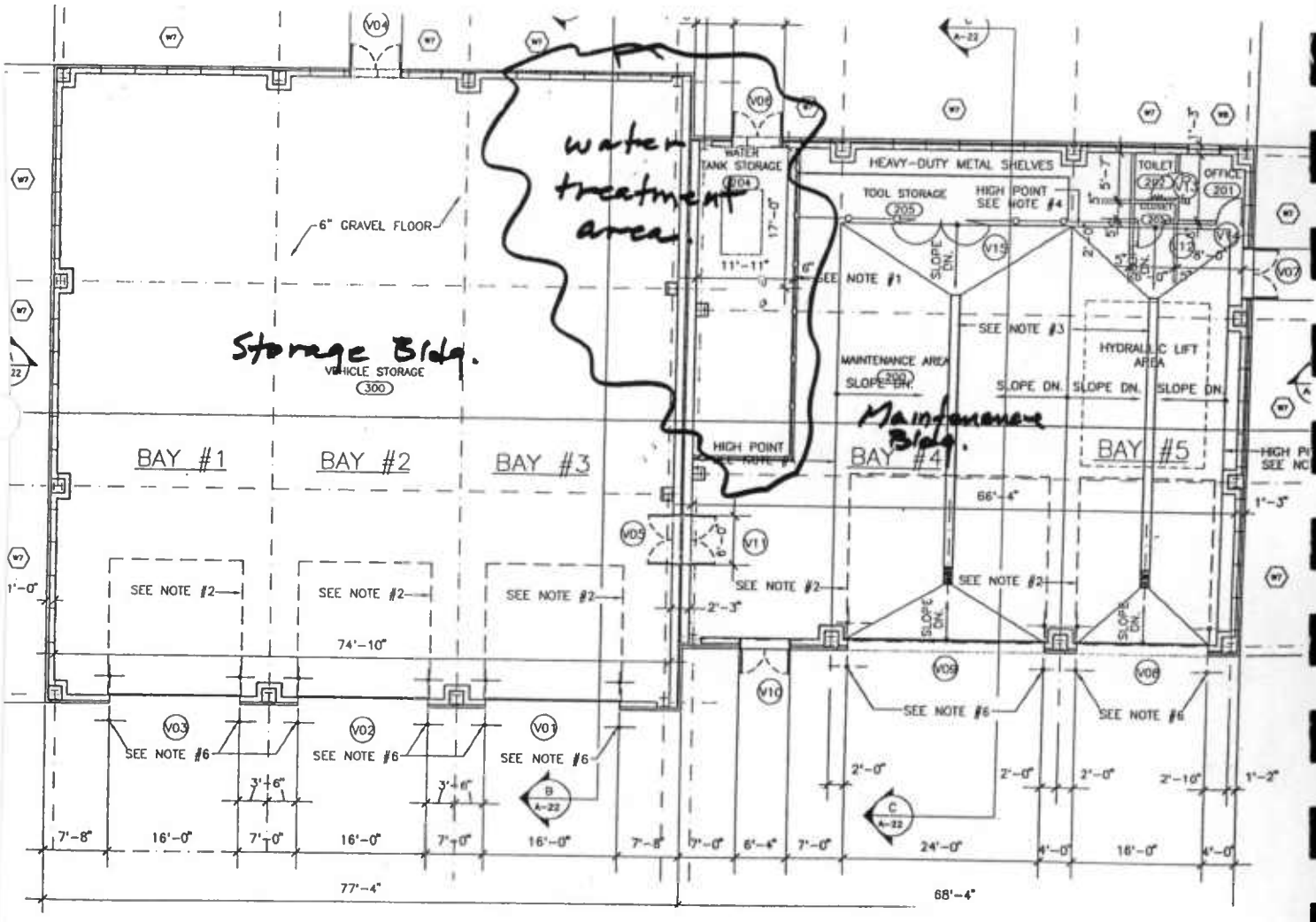


SITE PLAN - WATER LINE

PMSI

VALUE ENGINEERING PROPOSAL

ORIGINAL SKETCH A - 08

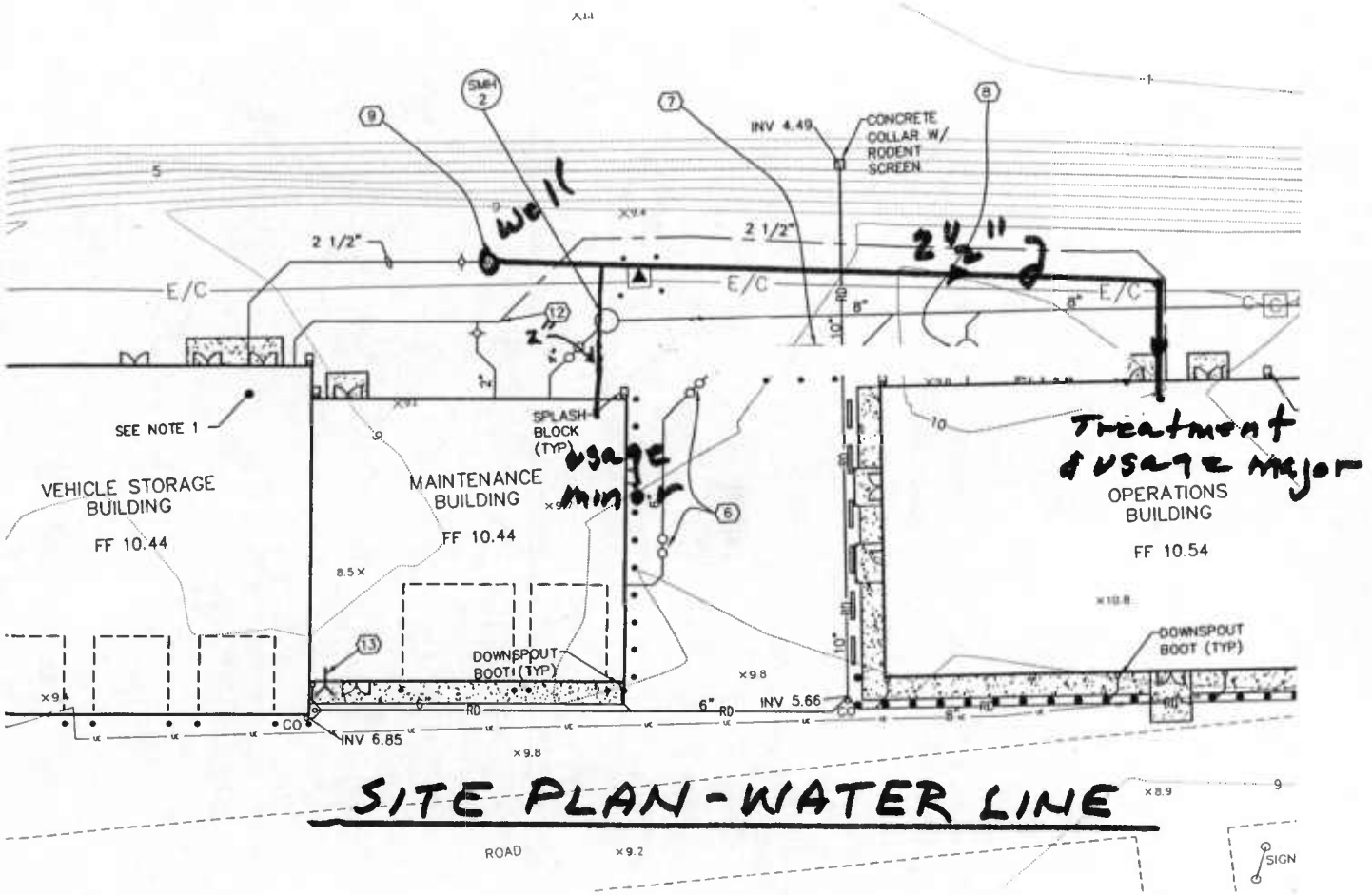


FLOOR PLAN

PMSI

VALUE ENGINEERING PROPOSAL

PROPOSED CHANGE A - 08

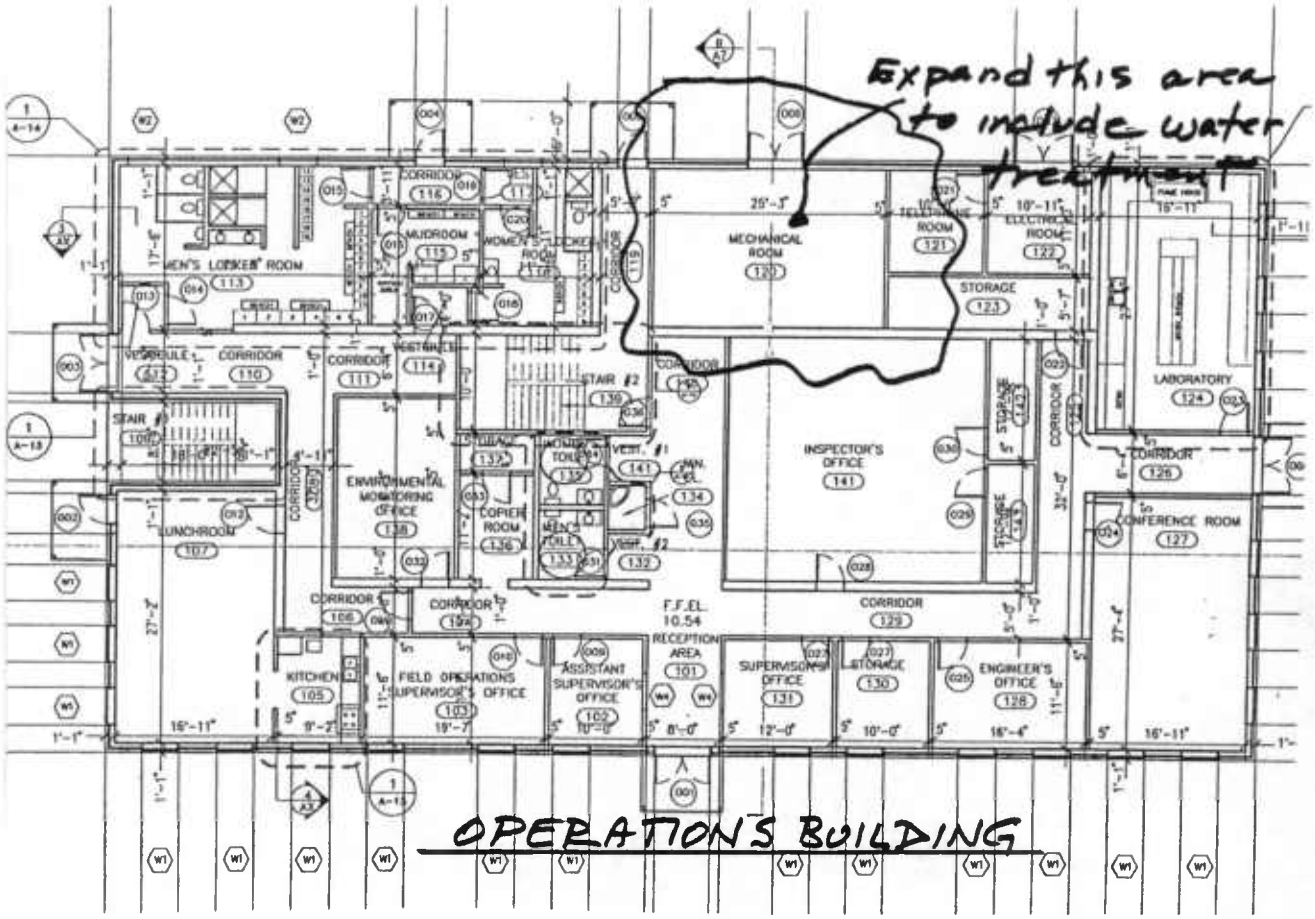


SITE PLAN - WATER LINE

PMSI

VALUE ENGINEERING PROPOSAL

PROPOSED CHANGE A - 08



PMSI

VALUE ENGINEERING PROPOSAL

COST ESTIMATING WORKSHEET

A - 08

Item	*Quantity*	*Unit*	*Unit Cost*	*Cost*	*Cost w/ Mark-Up*	*Source Code**
Original						
2-1/2" dia. Pipe, PVC	475	LF	$22.00	$10,450	$14,469	3
Excavation & Backfill	475	LF	$4.37	$2,076	$2,874	3
Electric Unit Heater, 2kw	4	EA	$520.00	$2,080	$2,880	3
H.M. pair door, frame with hardware	1	PR	$1,173.00	$1,173	$1,624	1
			Total:		$21,847	
Proposed						
2-1/2" dia. Pipe, PVC	220	LF	$22.00	$4,840	$6,701	3
Excavation & Backfill	475	LF	$4.37	$2,076	$2,874	3
Electric Unit Heater, 4kw	2	EA	$560.00	$1,120	$1,551	3
			Total:		$11,126	
			Initial Cost Savings:		$10,721	

Default mark-up Rate 38.46%

** Source Code 1. Project Cost Estimate 2. MCACES Data Base 3. R.S. Means 4. Other - VE Team*

VALUE ENGINEERING PROPOSAL

PROJECT TITLE: Operations Buildings

PROJECT LOCATION: Poplar Island

PROPOSAL NO: A-11

DESCRIPTION:	Recognize need for bridge crane in vehicle maintenance building.
CRITERIA CHALLENGE	No
FUNCTION:	Support Loads
ORIGINAL DESIGN:	No bridge crane or hoist capability is shown in the vehicle maintenance building.
PROPOSED DESIGN:	Provide a bridge crane, say 10 ton capacity, for vehicle maintenance facility.
ADVANTAGES:	* Need to lift heavy engines on earth moving equipment repairs.
DISADVANTAGES:	* Increases cost.
JUSTIFICATION:	The function of this building was stated to be major and minor repairs of equipment utilized in the island operations. This includes heavy earth moving equipment, dozers, loaders and trucks. Provision needs to be made for changing of a heavy engine.

Design Suggestion

PMSI

VALUE ENGINEERING PROPOSAL

PROJECT TITLE: Operations Buildings

PROJECT LOCATION: Poplar Island

PROPOSAL NO: A - 17

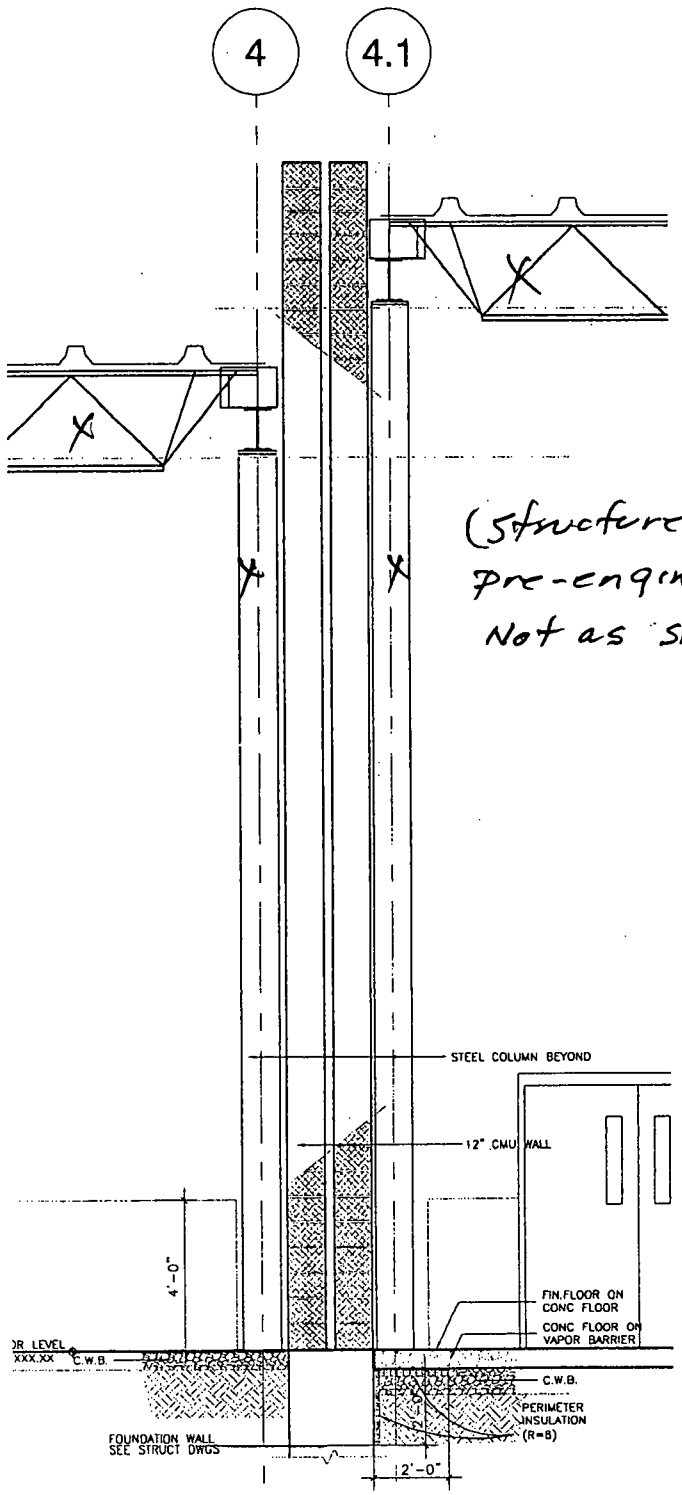
DESCRIPTION:	Eliminate double wall between vehicle maintenance and storage buildings.
CRITERIA CHALLENGE	No
FUNCTION:	Contain Fire
ORIGINAL DESIGN:	Two parallel 12" thick CMU walls on concrete wall footings are located between the vehicle maintenance and the equipment storage buildings.
PROPOSED DESIGN:	Build a single 12" thick CMU wall in this location.
ADVANTAGES:	* Less cost. * Double wall not needed.
DISADVANTAGES:	* None apparent.
JUSTIFICATION:	This separation was indicated to have a 3 hour fire rating. The actual fire separation rating should be determined. It is believed that one 12" thick CMU well would be adequate. A double wall is unnecessary. Both structures would be built at the same time, so closure of one is not a problem.

Initial Savings: $38,292

PMSI

VALUE ENGINEERING PROPOSAL

ORIGINAL SKETCH A - 17



2 WALL SECTION
SCALE: 1/2" = 1'-0"

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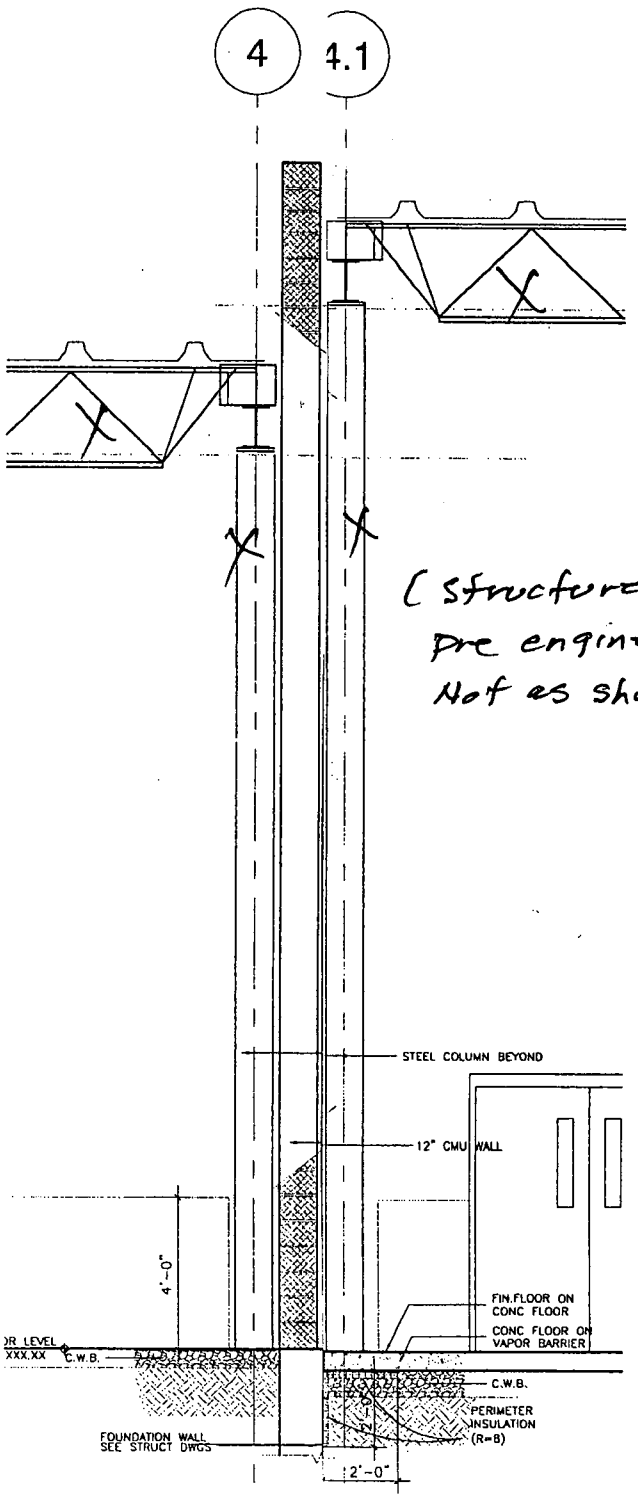
VALUE ENGINEERING PROPOSAL

PROPOSED CHANGE A - 17



(Structures are pre engineered buildings. Not as shown here)

WALL SECTION

PMSI

VALUE ENGINEERING PROPOSAL

COST ESTIMATING WORKSHEET

A - 17

Item	*Quantity*	*Unit*	*Unit Cost*	*Cost*	*Cost w/ Mark-Up*	*Source Code**
Original						
Double masonry wall 12" thick	4928	SF	$7.65	$37,699	$52,198	1
Productivity adjustment for masonry	4928	SF	$1.19	$5,864	$8,120	4
Wall foundation	17	CY	$261.26	$4,441	$6,150	1
Bond beams and caping	140	LF	$37.30	$5,222	$7,230	1
H.M. pair door, frame with hardware	2	PR	$1,173.00	$2,346	$3,248	1
			Total:		$76,946	
Proposed						
Single masonry wall 12" thick	2464	SF	$7.65	$18,850	$26,099	1
Productivity adjustment for masonry	2464	SF	$1.19	$2,932	$4,060	4
Wall foundation	8	CY	$261.26	$2,090	$2,894	1
Bond beams and caping	77	LF	$37.30	$2,872	$3,977	1
H.M. pair door frame with hardware	1	PR	$1,173.00	$1,173	$1,624	1
			Total:		$38,654	
			Initial Cost Savings:		$38,292	

Default mark-up Rate 38.46%

** Source Code 1. Project Cost Estimate 2. MCACES Data Base 3. R.S. Means 4. Other - VE Team*

VALUE ENGINEERING PROPOSAL

PROJECT TITLE: Operations Buildings

PROJECT LOCATION: Poplar Island

PROPOSAL NO: A-30

DESCRIPTION: Aim for SPiRiT Bronze Certification.

CRITERIA CHALLENGE No

FUNCTION: Sustain Environment

ORIGINAL DESIGN: No sustainable design considerations are recognized from the design narratives.

PROPOSED DESIGN: Use the Army's Sustainable Project Rating Tool (SPiRiT) and aim for the Bronze Certification or higher. A SPiRiT Gold is reachable with a concerted design effort.

ADVANTAGES:

* Promotes sustainable design.
* Meets USACE requirement.
* Impresses visitors with environmentally responsible building design.

DISADVANTAGES:

* Requires additional design analyses
* May add to initial cost.

JUSTIFICATION: The USCOE requires that all new project be designed to the Bronze level of SPiRiT, which is similar to the Leadership in Energy & Environmental Design (LEED). Features in the project that will promote sustainability can provide an opportunity as a showcase for the many visitor groups that will come to the island. For example, the Chesapeake Foundation building has attained a LEED platinum (highest) rating.

This project is already incorporating some sustainable design features, such as:

* Electric vehicle fueling station.
* Operable windows.
* Thermostat for every room.

Examples of possible sustainable features that can be considered for this project include:

VALUE ENGINEERING PROPOSAL

* Waterless urinals to reduce water use.
* Occupancy sensors and other energy saving measures.
* Renewable energy that can serve as another feature exhibit, such as wave energy. Co-funding for developing technologies may be available from DOE or other sponsors.
* Construction waste management.
* Certified wood.
* Low Emitting Materials.

See attached form for a sample identification of potentially achievable SPiRiT points that would result in a Gold level.

Design Suggestion

PMSI

VALUE ENGINEERING PROPOSAL

ATTACHMENT A - 30

Facility Points Summary

1.0	**Sustainable Sites (S)**	**Score**	**0**	**Max 20**
1.R1	❑ Erosion, Sedimentation and Water Quality Control		✓	[Required]
1.C1	❑ Site Selection		0	2
1.C2	❑ Installation/Base Redevelopment		0	2
1.C3	❑ Brownfield Redevelopment		0	1
1.C4	❑ Alternative Transportation		1	4
1.C5	❑ Reduced Site Disturbance		2	2
1.C6	❑ Stormwater Management		2	2
1.C7	❑ Landscape and Exterior Design to Reduce Heat Islands		1	2
1.C8	❑ Light Pollution Reduction		1	1
1.C9	❑ Optimize Site Features		1	1
1.C10	❑ Facility Impact		1	2
1.C11	❑ Site Ecology		1	1
2.0	**Water Efficiency (W)**	**Score**	**0**	**Max 5**
2.C1	❑ Water Efficient Landscaping		1	2
2.C2	❑ Innovative Wastewater Technologies		1	1
2.C3	❑ Water Use Reduction		1	2
3.0	**Energy and Atmosphere (E)**	**Score**	**0**	**Max 28**
3.R1	❑ Fundamental Building Systems Commissioning		✓	[Required]
3.R2	❑ Minimum Energy Performance		✓	[Required]
3.R3	❑ CFC Reduction in HVAC&R Equipment		✓	[Required]
3.C1	❑ Optimize Energy Performance		5	20
3.C2	❑ Renewable Energy		4	4
3.C3	❑ Additional Commissioning		1	1
3.C4	❑ <<Deleted>>			
3.C5	❑ Measurement and Verification		1	1
3.C6	❑ Green Power		0	1
3.C7	❑ Distributed Generation		0	1
4.0	**Materials and Resources (M)**	**Score**	**0**	**Max 13**
4.R1	❑ Storage & Collection of Recyclables		✓	[Required]
4.C1	❑ Building Reuse		0	3
4.C2	❑ Construction Waste Management		1	2
4.C3	❑ Resource Reuse		1	2
4.C4	❑ Recycled Content		1	2
4.C5	❑ Local/Regional Materials		0	2
4.C6	❑ Rapidly Renewable Materials		0	1
4.C7	❑ Certified Wood		1	1

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VALUE ENGINEERING PROPOSAL

ATTACHMENT A - 30

5.0	Indoor Environmental Quality (IEQ) [Q]	Score	0	Max 17
5.R1	❑ Minimum IAQ Performance		✓	[Required]
5.R2	❑ Environmental Tobacco Smoke (ETS) Control		✓	[Required]
5.C1	❑ IAQ Monitoring		1	1
5.C2	❑ Increase Ventilation Effectiveness		1	1
5.C3	❑ Construction IAQ Management Plan		1	2
5.C4	❑ Low-Emitting Materials		4	4
5.C5	❑ Indoor Chemical and Pollutant Source Control		1	1
5.C6	❑ Controllability of Systems		2	2
5.C7	❑ Thermal Comfort		2	2
5.C8	❑ Daylight and Views		2	2
5.C9	❑ Acoustic Environment /Noise Control		1	1
5.C10	❑ Facility In-Use IAQ Management Plan		1	1

Facility Points Summary (Continued)

				Maximum Points
6.0	Facility Delivery Process (P)	Score	0	Max 7
6.C1	❑ Holistic Delivery of Facility		7	7
7.0	Current Mission	Score	0	Max 6
7.C1	❑ Operation and Maintenance		3	3
7.C2	❑ Soldier and Workforce Productivity and Retention		3	3
8.0	Future Missions	Score	0	Max 4
8.C1	❑ Functional Life of Facility and Supporting Systems		2	2
8.C2	❑ Adaptation, Renewal and Future Uses		1	2

Total Score 0 Max 100

SPiRiT Sustainable Project Certification Levels

SPiRiT Bronze		25 to 34 Points
SPiRiT Silver		35 to 49 Points
SPiRiT Gold	60	50 to 74 Points
SPiRiT Platinum		75 to 100 Points

PMSI

VALUE ENGINEERING PROPOSAL

PROJECT TITLE: Operations Buildings

PROJECT LOCATION: Poplar Island

PROPOSAL NO: A - 32

DESCRIPTION:	Reduce default ceiling height to 8'-0".
CRITERIA CHALLENGE	No
FUNCTION:	Finish Space
ORIGINAL DESIGN:	Minimum ceiling height is 8'-6".
PROPOSED DESIGN:	Make default ceiling height 8'-0". Reduces exterior wall height accordingly.
ADVANTAGES:	* Less cost. * Facilitates accomodating wall board standard height of 8-foot.
DISADVANTAGES:	* None apparent.
JUSTIFICATION:	With an 8'--6" ceiling height a 4' x 10' wall board is needed on all the interior walls. By making the ceiling height 8'-0" instead, a 4' x 8' wall board can be utilized without cutting. Additional cost savings would be realized if ceiling space can be reduced, resulting in additional exterior wall reduction.

Initial Savings: $15,552

PMSI

VALUE ENGINEERING PROPOSAL

COST ESTIMATING WORKSHEET

A - 32

Item	*Quantity*	*Unit*	*Unit Cost*	*Cost*	*Cost w/ Mark-Up*	*Source Code**
Original						
5/8" Gypsum plasterboard wall using 10' boards cut	26146	SF	$1.37	$35,820	$49,596	1
Add for high ceiling, over 8'	26146	SF	$0.26	$6,798	$9,412	3
Walls, brick	188	SF	$8.86	$1,666	$2,306	1
Insulation & vapor barrier	188	SF	$1.58	$297	$411	1
Interior skin	188	SF	$1.94	$365	$505	1
			Total:		$62,231	
Proposed						
5/8 Gypsum plasterboard wall using 8' boards uncut	24608	SF	$1.37	$33,713	$46,679	1
			Total:		$46,679	
			Initial Cost Savings:		$15,552	

Default mark-up Rate 38.46%

** Source Code 1. Project Cost Estimate 2. MCACES Data Base 3. R.S. Means 4. Other - VE Team*

PMSI

VALUE ENGINEERING PROPOSAL

PROJECT TITLE: Operations Buildings

PROJECT LOCATION: Poplar Island

PROPOSAL NO: A - 36

DESCRIPTION: Extend metal siding and omit masonry at the Vehicle Maintenance and Storage Buildings.

CRITERIA CHALLENGE No

FUNCTION: Enclose Building

ORIGINAL DESIGN: The lower part of exterior wall of vehicle storage/maintenance building is masonry. The major part of building exterior consists of pre-fabricated metal panels.

PROPOSED DESIGN: Delete the masonry portion of the exterior wall and extend the pre-fabricated metal panels. Install shaped sheet metal and screening at base to control rodents.

ADVANTAGES:

* Simplifies construction.
* Speeds erection.
* Reduces on-site labor.
* Simplify transportation of materials.
* Reduces cost.

DISADVANTAGES:

* None apparent.

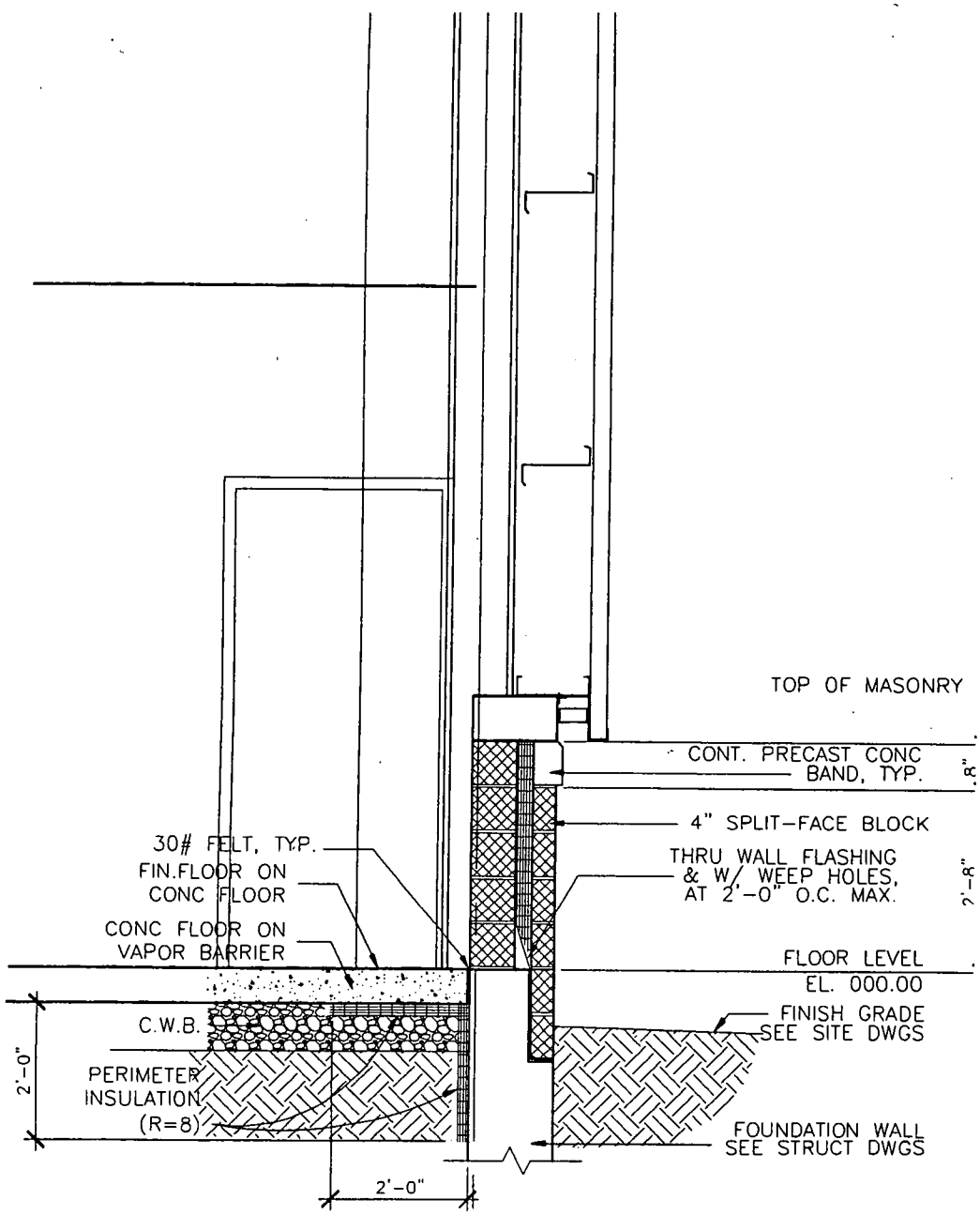
JUSTIFICATION: The primary purpose for using masonry veneer, as presented during the briefing, is to keep rodents (mice) out of the building. The proposed use of prefab metal panels with shaped sheet metal/screening at the base will accomplish the rodent control while allowing the benefits listed under "advantages."

A labor factor is added to the cost estimate to account for the productivity reduction for on-site masonry labor.

Initial Savings: $29,874

VALUE ENGINEERING PROPOSAL

ORIGINAL SKETCH A - 36

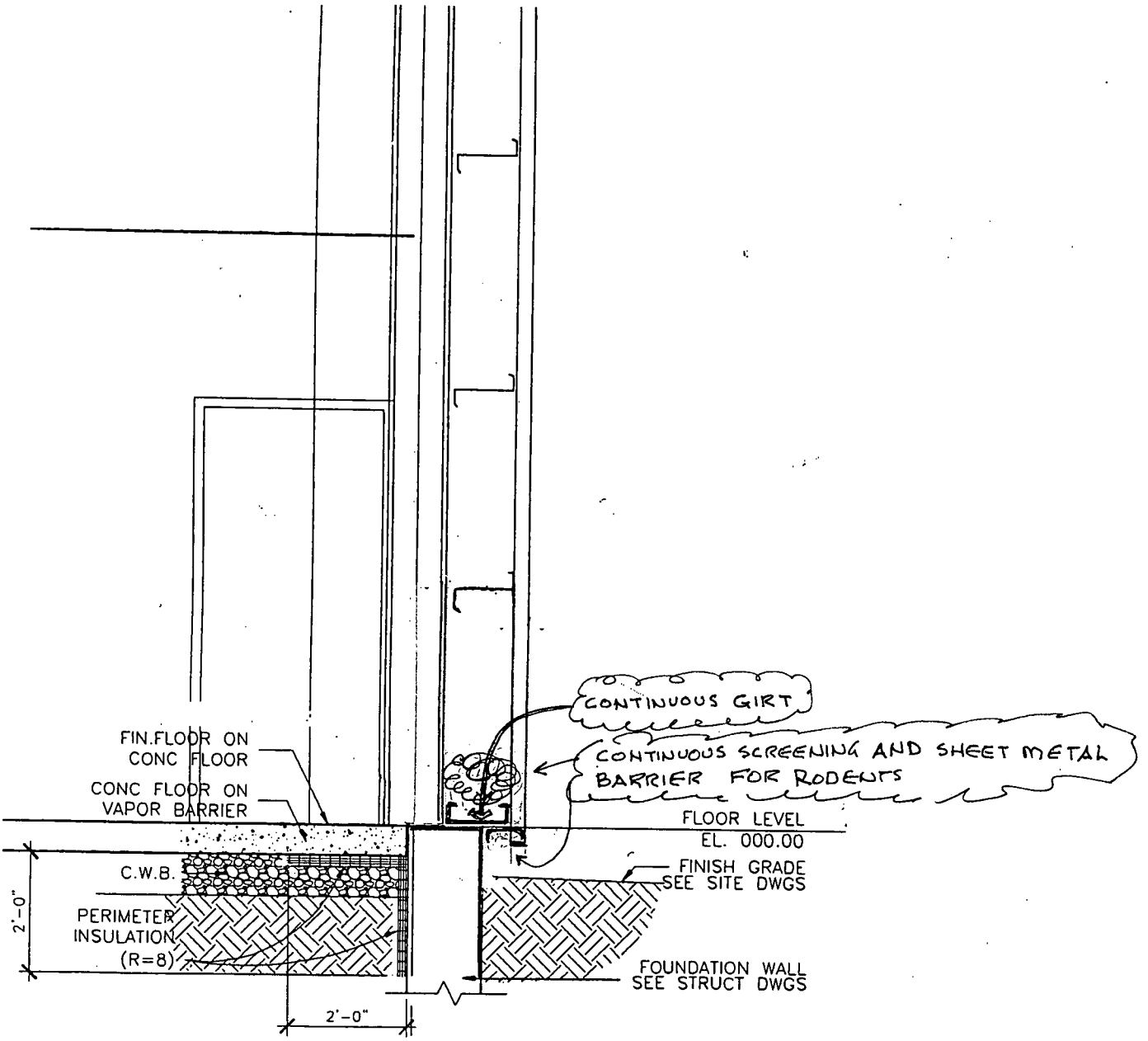


3 **WALL SECTION**
SCALE: 1/2" = 1'-0"

0 1' 2' 4'
SCALE: 1/2" = 1'-0"

VALUE ENGINEERING PROPOSAL

PROPOSED CHANGE A - 36



3 WALL SECTION
SCALE: 1/2" = 1'-0"

0 1' 2' 4'
SCALE: 1/2" = 1'-0"

PMSI

VALUE ENGINEERING PROPOSAL

COST ESTIMATING WORKSHEET

A - 36

Item	*Quantity*	*Unit*	*Unit Cost*	*Cost*	*Cost w/ Mark-Up*	*Source Code**
Original						
8" C.M.U. wall	1498	SF	$6.30	$9,437	$13,067	3
Productivity adjustment for CMU wall	1498	SF	$1.00	$1,498	$2,074	4
3" rigid wall insul.	1498	SF	$1.12	$1,678	$2,323	3
4" split face block	1800	SF	$7.30	$13,140	$18,194	3
Productivity adjustment for split face block	1800	SF	$1.28	$2,304	$3,190	4
Through wall flashing and weep holes	790	SF	$0.75	$593	$820	4
8" H x 6" precast concrete band	450	LF	$10.50	$4,725	$6,542	4
			Total:		$46,211	
Proposed						
Additional steel girt	450	LF	$3.60	$1,620	$2,243	4
Shaped sheet metal and screen closure	450	LF	$2.70	$1,215	$1,682	3
Additional metal siding	1800	SF	$4.98	$8,964	$12,412	3
			Total:		$16,337	
			Initial Cost Savings:		$29,874	

Default mark-up Rate 38.46%

** Source Code 1. Project Cost Estimate 2. MCACES Data Base 3. R.S. Means 4. Other - VE Team*

VALUE ENGINEERING PROPOSAL

PROJECT TITLE:	Operations Buildings
PROJECT LOCATION:	Poplar Island
	PROPOSAL NO: C-01
DESCRIPTION:	Review structural loads.
CRITERIA CHALLENGE	No
FUNCTION:	Support Loads
ORIGINAL DESIGN:	The design narrative notes a wind load of 110 mph speed, I=1.0 and exposure D. The live load for observation deck on the first floor roof is not specified. Provisions for snow and ice buildup in roof or deck loading are not specified.
PROPOSED DESIGN:	Review structural loads in view of historical Chesapeake Bay wind/squall records. Use 100 psf live load for public use observation deck. Provide for snow and ice buildup loads in appropriate locations.
ADVANTAGES:	* Design match to realistic loading conditions.
DISADVANTAGES:	* None apparent.
JUSTIFICATION:	

Design Suggestion

VALUE ENGINEERING PROPOSAL

PROJECT TITLE: Operations Buildings

PROJECT LOCATION: Poplar Island

PROPOSAL NO: E-01

DESCRIPTION: Develop an electrical master plan.

CRITERIA CHALLENGE No

FUNCTION: Coordinate Design

ORIGINAL DESIGN: The design drawings do not include details of the existing site conditions.

PROPOSED DESIGN: Develop a site master plan to include provisions for the distribution of emergency and non-emergency power to the various site loads. See proposed sketch for an example.

ADVANTAGES:
* Coordinates with other site power requirements.
* Reduces need for separate project or future modifications.

DISADVANTAGES:
* May increase cost for this project.

JUSTIFICATION: The total electrical power distribution costs for this project cannot be clearly defined without definition of the overall site electrical power distribution requirements.

If a central power distribution switchboard is required for the site, it can be incorporated in this project, minimizing future cost. The central power distribution switchboard can be used to distribute emergency power, if required.

The existing design does not consider the present and future site loads. The electrical service schematic only includes new work. The adequacy of the emergency generator is unknown without some definition of the emergency power requirements throughout the site.

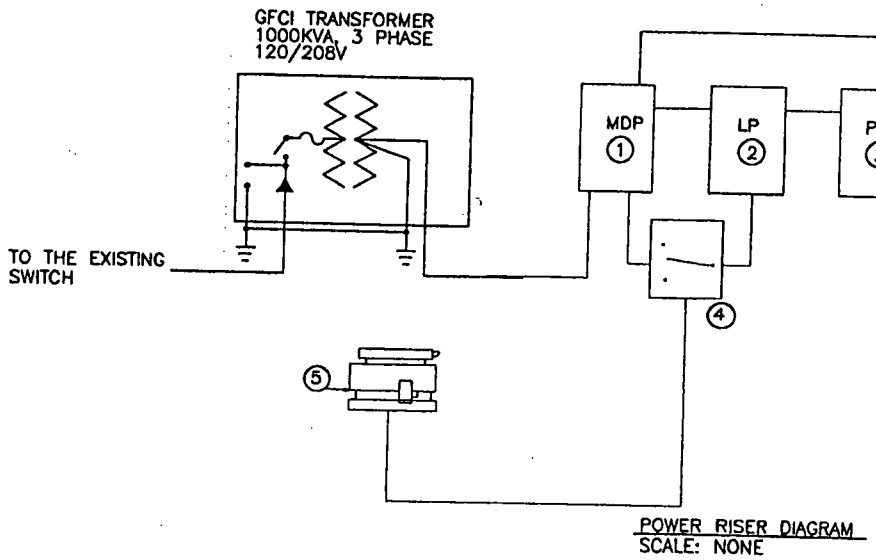
Design Suggestion

PMSI

VALUE ENGINEERING PROPOSAL

ORIGINAL SKETCH E - 01

NOTE: DRAWING NOT COMPLETE. WILL COMPLETE FOR NEXT SUBMISSION



POWER RISER DIAGRAM
SCALE: NONE

POWER RISER NOTES

① MAIN DISTRIBUTION PANEL

② PANEL FOR ADMIN BUILDING

③ RECEPTACLE PANEL FOR ADMIN BUILDING

④ AUTOMATIC TRANSFER SWTCH, GFCI

⑤ 45KW GENERATOR, GFCI

⑥ PANEL FOR THE MAINTENANCE BUILDING

PMSI

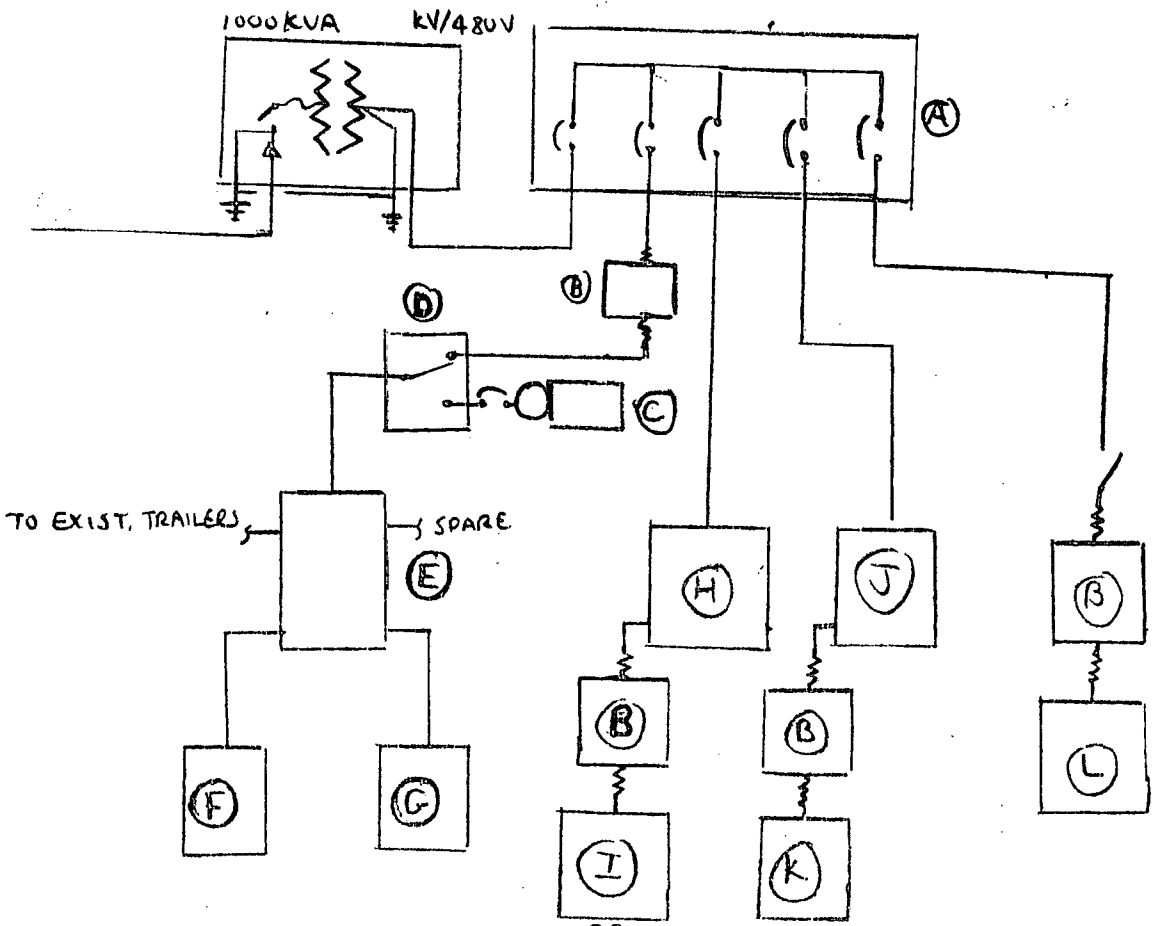
VALUE ENGINEERING PROPOSAL

PROPOSED CHANGE E - 01

Develop an Electrical Master Plan

LEGEND

Ⓐ 1600A Site Distribution Swbd 480V
Ⓑ 480/120/208V Step-Down xfmr
Ⓒ 45 KW Generator 120/208V
Ⓓ Automatic Transfer Switch
Ⓔ 120/208V Main Emergency Power Panel
Ⓕ Operations Building Emergency Panel 120/208V
Ⓖ Storage & Maintenance Bldg Emergency Panel 120/208V
Ⓗ Operations Bldg 480V Panel
Ⓘ Operations Blvd 208V Panel
Ⓙ Maintenance & Storage Bldg 480V Panel
Ⓚ Maintenance & Storage Bldg 208V Panel
Ⓛ Trailer 208V Panel



VALUE ENGINEERING PROPOSAL

PROJECT TITLE: Operations Buildings

PROJECT LOCATION: Poplar Island

PROPOSAL NO: E-02

DESCRIPTION: Use Romex cables in lieu of Metal Clad cables for branch wiring.

CRITERIA CHALLENGE No

FUNCTION: Distribute Power

ORIGINAL DESIGN: EMT and type MC cable are proposed for the interior branch wiring.

PROPOSED DESIGN: Install Romex (non-metallic sheathed) cabling in lieu of EMT and/or type MC cable

ADVANTAGES:
* Ease of installation.
* Lower installation costs (i.e. less labor intensive).
* Industry standard when wood studs are specified.
* Reduces initial cost.

DISADVANTAGES:
* Cabling is more susceptible to damage during installation or from rodents.
* Ground conductor serves as the sole grounding path.

JUSTIFICATION: Romex cables is appropriate for wood stud framing. In normal circumstances both labor and material for Romex cables are lower than that for MC cables or EMT conduits. In this project it will be more so because the labor force will have to be transported by boat to the site on a daily basis and Romex is much lower weight and volume than MC cables or EMT conduits.

The cost estimate includes Romex cables. However, the designer indicates that MC cables will be used.

Initial Savings: $14,385

VALUE ENGINEERING PROPOSAL

COST ESTIMATING WORKSHEET

E - 02

Item	*Quantity*	*Unit*	*Unit Cost*	*Cost*	*Cost w/ Mark-Up*	*Source Code**
Original						
Type MC cable	22585	LF	$2.30	$51,946	$71,924	3
			Total:		$71,924	
Proposed						
Non-metallic sheathed cable (Romex)	22585	LF	$1.84	$41,556	$57,539	1
			Total:		$57,539	
			Initial Cost Savings:		$14,385	

Default mark-up Rate 38.46%

** Source Code 1. Project Cost Estimate 2. MCACES Data Base 3. R.S. Means 4. Other - VE Team*

VALUE ENGINEERING PROPOSAL

PROJECT TITLE: Operations Buildings

PROJECT LOCATION: Poplar Island

PROPOSAL NO: E-04

DESCRIPTION: Delete the CCTV System

CRITERIA CHALLENGE No

FUNCTION: Monitor Site

ORIGINAL DESIGN: Design drawings indicate the installation of six CCTV cameras to monitor access to the operations, storage and maintenance buildings. The cost estimate reflects the installation of 18 cameras between the three buildings.

PROPOSED DESIGN: Delete the installation of the entire security system.

ADVANTAGES:
* Reduces initial cost.
* Eliminates O&M cost of equipment.

DISADVANTAGES:
* Personnel accessing the building will not be visually recorded.
* The site will not be monitored while staff personnel are away.

JUSTIFICATION: The purpose of the CCTV system is to record intrusion events when the building is not occupied. The remote location of the island makes vandalism and theft unlikely events. This system would have no value at all against intruders who simply mask their faces.

The savings calculated in this proposal reflects the quantity in the drawings and not the cost estimate.

Initial Savings: $145,076

VALUE ENGINEERING PROPOSAL

COST ESTIMATING WORKSHEET

E - 04

Item	*Quantity*	*Unit*	*Unit Cost*	*Cost*	*Cost w/ Mark-Up*	*Source Code**
Original						
Cameras, poles, mounting hardware	6	EA	$16,048.00	$96,288	$133,320	1
Accessories	1	LS	$8,490.00	$8,490	$11,755	1
			Total:		$145,076	
			Initial Cost Savings:		$145,076	

Default mark-up Rate 38.46%

** Source Code 1. Project Cost Estimate 2. MCACES Data Base 3. R.S. Means 4. Other - VE Team*

VALUE ENGINEERING PROPOSAL

PROJECT TITLE: Operations Buildings

PROJECT LOCATION: Poplar Island

PROPOSAL NO: M-02

DESCRIPTION: Use electric heat. Delete ground source heat pump.

CRITERIA CHALLENGE No

FUNCTION: Condition Space

ORIGINAL DESIGN: Heat pumps provide 55F air to the two air handling units. Electric reheat in the VAV boxes provide additional heating when needed.

PROPOSED DESIGN: Use electric heating coil and DX cooling coils in lieu of heat pumps in the air handling units. Delete the ground source heat pump wells.

ADVANTAGES:
* Reduces initial cost.
* Deletes need for drilling equipment on island.

DISADVANTAGES:
* Slightly higher energy cost.

JUSTIFICATION: The ground source heat pump is not the right application for this project. The HVAC load for this project is small. The two heat pump units provide a total of 23 ton of cooling and 90 MBH of heating. This can be more economically provided by DX cooling and electric heat. The cost of bringing drilling equipment out to the island to install a few ground source wells will not be economical.

Most of the heating for the project will be electric heating anyway. The total heating capacity for the project is 400 MBH, and the heat pumps are only sized for 90 MBH (23%). Heating for the vehicle maintenance building and the locker rooms are provided by electric unit heaters and electric convection units, respectively. Each VAV box has electric reheat. The heat pumps only heat the air up to 55F. Water source heat pump is a very costly system that does very little in this project.

Although electric heat and DX cooling will use more electricity, the power capacity is available and total life cycle cost will be lower.

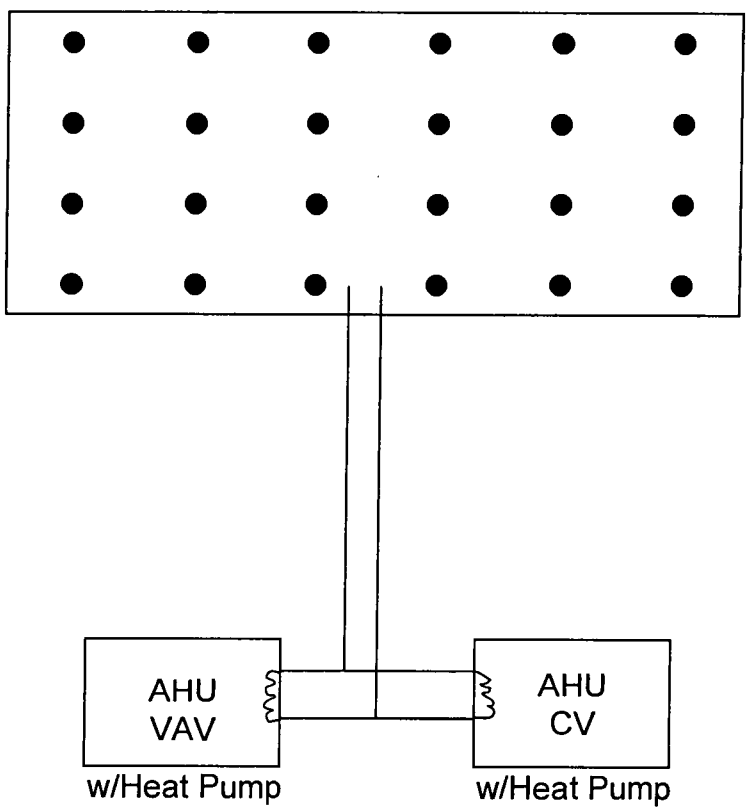
Initial Savings:	$72,741
O/M Savings:	($19,553)
Total Savings:	$53,188

PMSI

VALUE ENGINEERING PROPOSAL

ORIGINAL SKETCH M - 02

Vertical Ground Coupled Heat Exchange System



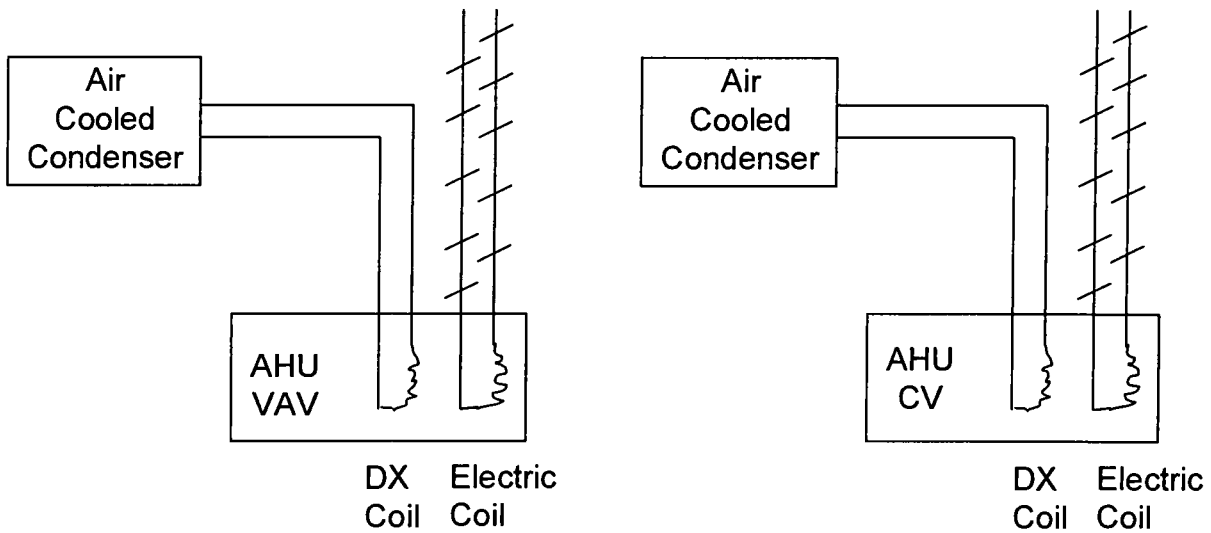
Typ.

VAV Box
Electric
Reheat

PMSI

VALUE ENGINEERING PROPOSAL

PROPOSED CHANGE M - 02



Typ.

VAV Box
w/Electric
Heat

VALUE ENGINEERING PROPOSAL

COST ESTIMATING WORKSHEET

M - 02

Item	*Quantity*	*Unit*	*Unit Cost*	*Cost*	*Cost w/ Mark-Up*	*Source Code**
Original						
Vertical Ground Coupled Heat Exchange System	1	LS	$74,511.00	$74,511	$103,168	1
			Total:		$103,168	
Proposed						
Electric heating coil, 10 - 16kW	2	EA	$1,000.00	$2,000	$2,769	3
Air cooled condenser, 18 ton	1	EA	$15,000.00	$15,000	$20,769	3
Air cooled condenser, 7 ton	1	EA	$4,975.00	$4,975	$6,888	3
			Total:		$30,427	
			Initial Cost Savings:		$72,741	

Default mark-up Rate 38.46%

** Source Code 1. Project Cost Estimate 2. MCACES Data Base 3. R.S. Means 4. Other - VE Team*

VALUE ENGINEERING PROPOSAL

LIFE CYCLE COST ANALYSIS

M-02

Item	*EAG**	*Year***	*Quantity*	*Unit*	*Unit Cost*	*Annual Cost*	*NPV*
Original							
Cooling energy - heat pump	0.00%	25	12240	kWh	$0.04	$490	$7,730
Demand charge - cooling (4 months)	0.00%	25	20	kW	$38.08	$762	$12,025
Heating energy - heat pump	0.00%	25	5256	kWh	$0.04	$210	$3,319
Demand charge - heating (4 months)	0.00%	25	10.3	kW	$28.52	$294	$4,638
Ground source pumping	0.00%	25	7800	kWh	$0.04	$312	$4,926
					Total		$32,638
Proposed							
Cooling energy - DX	0.00%	25	19296	KWh	$0.04	$772	$12,186
Demand charge - cooling (4 months)	0.00%	25	26.8	kW	$38.08	$1,021	$16,113
Heating energy - electric resistant	0.00%	25	19008	kWh	$0.04	$760	$12,004
Demand charge - heating (4 months)	0.00%	25	26.4	kW	$28.52	$753	$11,888
					Total		$52,191
					Operation/Maintenance Cost Savings		($19,553)

Real Discount Rate:	3.90%
Project Life (Year):	25

*EAG - Escalation above General Escalation

**Year - Year from base for one-time cost.
Interval for periodic cost
Project Life for annual cost

VALUE ENGINEERING PROPOSAL

Calculations

M-02

Assumptions:

Heat pump cooling COP = 4.75
Heat pump heating COP = 3.6
DX cooling COP = 3.02
Cooling equivalent hours = 720
Heat equivalent hours = 720
Heat pump pumping capacity = 3kW
Heat pump pumping hours = 2600 hours

Heat pump cooling power: 23 ton * 3.516 kw/ton /4.75 = 17 kW

Heat pump cooling energy: 17 kW* 720 hr = 12,240 kWH

DX Cooling power: 23 ton* 3.516 kw/ton / 3.02 = 26.8 kW

DX Cooling energy: 26.8kW * 720 hr = 19,296 kWH

Heat pump heating power: 90 MBH * .2931 kW/MBH / 3.6 = 7.3 kW

Heat pump heating energy: 7.3kW * 720 hr = 5,256 kW

Electric resistant heating power: 90 MBH * .2931 kW/MBH = 26.4 kW

Electric resistant heating energy: 26.4 kW* 720 hr = 19,008 kW

Heat pump pumping energy: 3kW * 2600 = 7,800 kWH

VALUE ENGINEERING PROPOSAL

PROJECT TITLE: Operations Buildings

PROJECT LOCATION: Poplar Island

PROPOSAL NO: M-03

DESCRIPTION: Use diesel fuel for heating. Delete ground source heat pump.

CRITERIA CHALLENGE No

FUNCTION: Condition Space

ORIGINAL DESIGN: Heat pumps provide 55F air to the two air handling units. Electric reheat in the VAV boxes provide additional heating when needed.

PROPOSED DESIGN: Use hot water heating coil and DX cooling coils in lieu of heat pumps in the air handling units. Provide diesel fuel fired hot water boiler in mechanical room. Delete the ground source heat pump wells.

ADVANTAGES:
* Reduces initial cost.
* Deletes need for drilling equipment on island.

DISADVANTAGES:
* Requires more frequent fuel deliveries.
* Increases energy cost.

JUSTIFICATION: The ground source heat pump is not the right application for this project. The HVAC load for this project is small. The two heat pump units provide a total of 23ton of cooling and 90 MBH of heating. This can be more economically provided by DX cooling and a diesel fueled boiler. The boiler can provide heating to the rest of the heaters, eliminating energy inefficient electric heating. The cost of bringing drilling equipment out to the island to install a few ground source wells will not be economical.

Most of the heating for the project will be electric heating. The total heating capacity for the project is 400 MBH, and the heat pumps are only sized for 90 MBH (23%). Heating for the vehicle maintenance building and the locker rooms are provided by electric unit heaters and electric convection units, respectively. Each VAV box have electric reheat. The heat pump only heats the air up to 55F. The heat pump is a very costly system that does very little in this project.

Diesel fuel is delivered regularly to the island for vehicle use. The

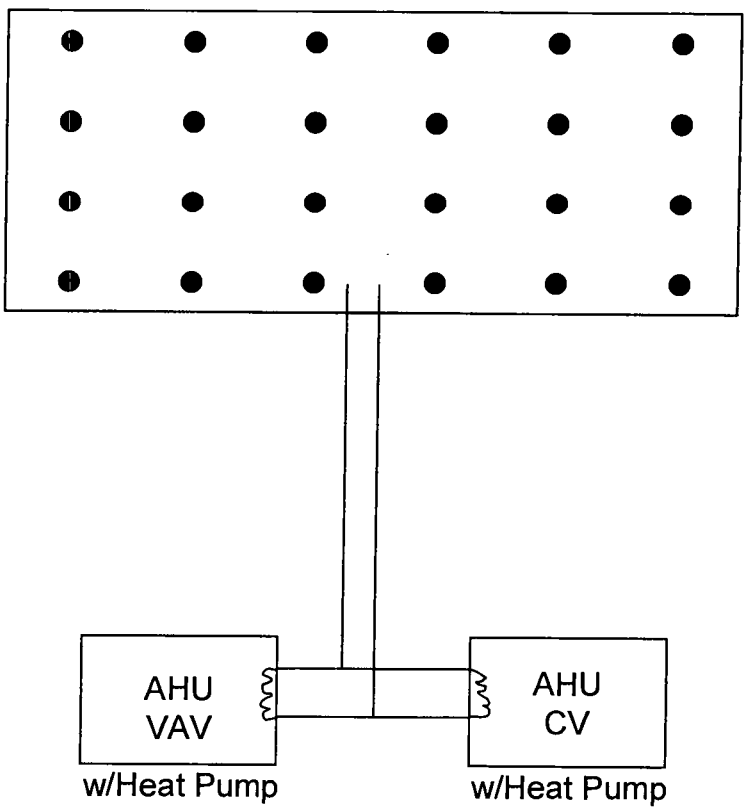
same fuel can be used in boilers to provide heating. There are currently three 8000 gallon diesel storage tanks on the island. One of which could store more than enough fuel for heating for the entire year.

Initial Savings:	$24,973
O/M Savings:	($8,128)
Total Savings:	$16,845

VALUE ENGINEERING PROPOSAL

ORIGINAL SKETCH M - 03

Vertical Ground Coupled Heat Exchange System



Typ.
VAV Box
Electric
Reheat

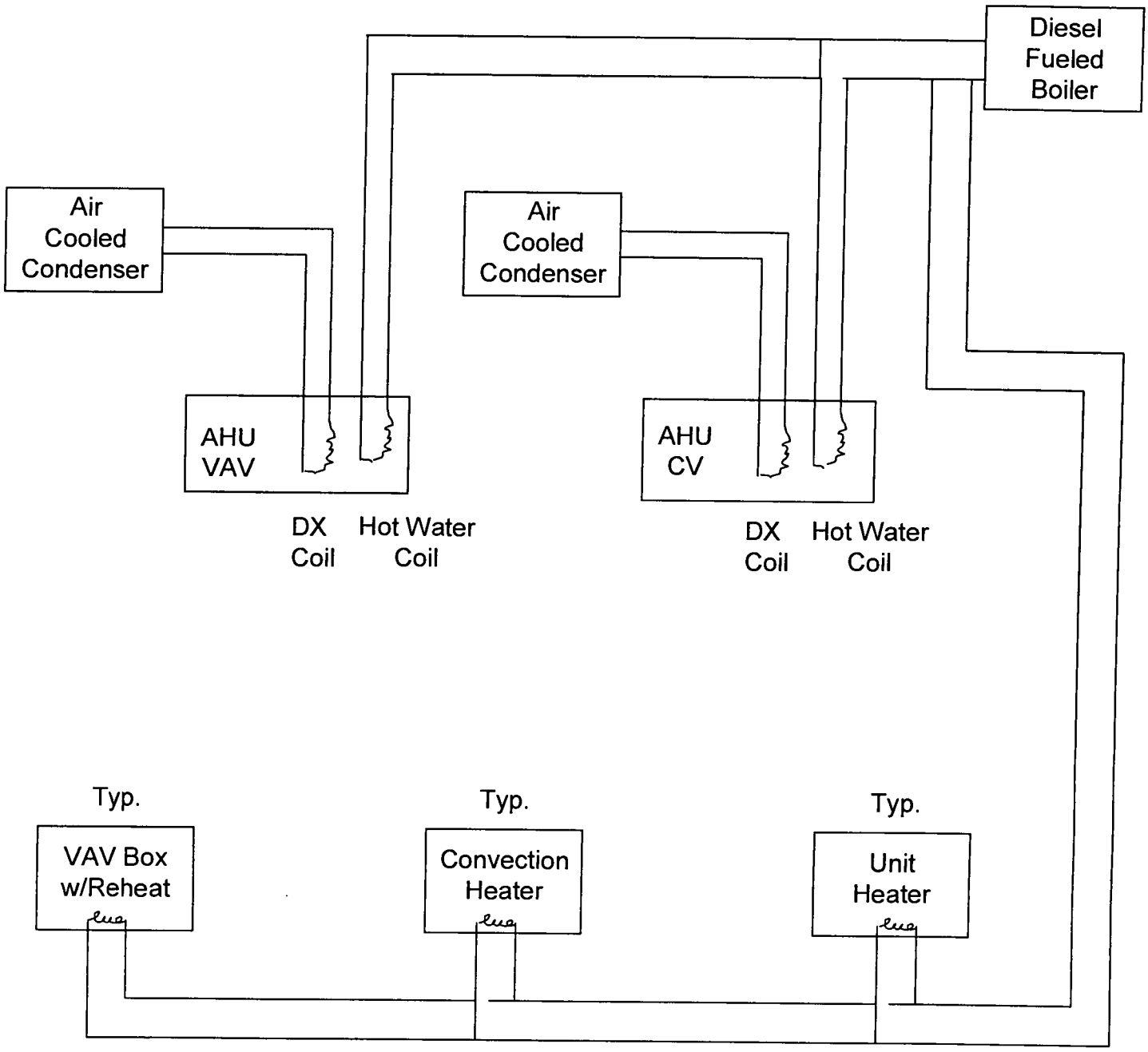
Typ.
Electric
Convection
Heater

Typ.
Electric
Unit
Heater

PMSI

VALUE ENGINEERING PROPOSAL

PROPOSED CHANGE M - 03



VALUE ENGINEERING PROPOSAL

COST ESTIMATING WORKSHEET M - 03

Item	*Quantity*	*Unit*	*Unit Cost*	*Cost*	*Cost w/ Mark-Up*	*Source Code**
Original						
Vertical Ground Coupled Heat Exchange System	1	LS	$74,511.00	$74,511	$103,168	1
			Total:		$103,168	
Proposed						
Diesel fuel boiler, 400 MBH	1	EA	$6,500.00	$6,500	$9,000	3
Hot water distribution piping	1500	LF	$20.00	$30,000	$41,538	4
Air cooled condenser, 18 ton	1	EA	$15,000.00	$15,000	$20,769	3
Air cooled condenser, 7 ton	1	EA	$4,975.00	$4,975	$6,888	3
			Total:		$78,195	
			Initial Cost Savings:		$24,973	

Default mark-up Rate 38.46%

** Source Code 1. Project Cost Estimate 2. MCACES Data Base 3. R.S. Means 4. Other - VE Team*

VALUE ENGINEERING PROPOSAL

LIFE CYCLE COST ANALYSIS

M-03

Item	*EAG**	*Year***	*Quantity*	*Unit*	*Unit Cost*	*Annual Cost*	*NPV*
Original							
Cooling energy - heat pump	0.00%	25	12240	kWh	$0.04	$490	$7,730
Demand charge - cooling (4 months)	0.00%	25	20	kW	$38.08	$762	$12,025
Heating energy - heat pump	0.00%	25	5256	kWh	$0.04	$210	$3,319
Ground source pumping	0.00%	25	7800	kWh	$0.04	$312	$4,926
Demand charge - heating (4 months)	0.00%	25	101.2	kW	$28.52	$2,886	$45,569
Heating energy - electric resistant	0.00%	25	65448	kWh	$0.04	$2,618	$41,333
					Total		$114,902
Proposed							
Cooling energy - DX	0.00%	25	19296	KWh	$0.04	$772	$12,186
Demand charge - cooling (4 months)	0.00%	25	26.8	kW	$38.08	$1,021	$16,113
Heating energy - diesel boiler	0.00%	25	3000	Gal	$2.00	$6,000	$94,731
					Total		$123,030
					Operation/Maintenance Cost Savings		($8,128)

Real Discount Rate:	3.90%
Project Life (Year):	25

*EAG - Escalation above General Escalation

**Year - Year from base for one-time cost.
Interval for periodic cost
Project Life for annual cost

VALUE ENGINEERING PROPOSAL

Calculations

M-03

Assumptions:

Heat pump cooling COP = 4.75
Heat pump heating COP = 3.6
DX cooling COP = 3.02
Boiler efficiency = 0.80
Diesel fuel heating value = 120,000 Btu / gallon
Cooling equivalent hours = 720
Heat equivalent hours = 720
Heat pump pumping capacity = 3kW
Heat pump pumping hours = 2600 hours

Heat pump cooling power: 23 ton * 3.516 kw/ton /4.75 = 17 kW

Heat pump cooling energy: 17 kW* 720 hr = 12,240 kWH

DX Cooling power: 23 ton* 3.516 kw/ton / 3.02 = 26.8 kW

DX Cooling energy: 26.8kW * 720 hr = 19,296 kWH

Heat pump heating power: 90 MBH * .2931 kW/MBH / 3.6 = 7.3 kW

Heat pump heating energy: 7.3kW * 720 hr = 5,256 kW

Electric resistant heating power: 310 MBH * .2931 kW/MBH = 90.9 kW

Electric resistant heating energy: 90.9 kW* 720 hr = 65,448 kW

Diesel fuel energy: 400 MBH /0.80 * 720 /120 MBH/gal = 3000 gallon.

Heat pump pumping energy: 3kW * 2600 = 7,800 kWH

VALUE ENGINEERING PROPOSAL

PROJECT TITLE: Operations Buildings

PROJECT LOCATION: Poplar Island

PROPOSAL NO: PM-01

DESCRIPTION: Cost Estimate Comments

CRITERIA CHALLENGE No

FUNCTION: Estimate Cost

ORIGINAL DESIGN: The design team estimated the construction cost at $2,792,636.

PROPOSED DESIGN: Review the estimate.

ADVANTAGES: * Improves cost estimate.

DISADVANTAGES: * None apparent.

JUSTIFICATION: Although the VE team was not tasked to validate the cost estimate, it has noticed several inconsistencies between the cost estimate and the design. Some cost comments may lead to reduction in the total cost (items 7-9). However, on the balance the cost estimate would likely to be higher as a result of these comments:

1. The contractor's overhead was estimated at 14% of the direct cost. This may not be sufficient to account for the difficulty of access to the site. Construction equipment and material has to be brought in and out by barges. Equipment may have to stay on site longer to avoid additional shipping. These adds significantly to the project cost.

2. No design contingency or escalation is included in this estimate. The VE team recommends using a 10% design contingency and a 3% annual escalation.

3. The labor productivity needs to be adjusted in light of the travel time to and from the job site. That is not apparent in the cost estimate.

4. Special equipment such as the elevator, bridge crane and the hydraulic lift for vehicles are not in the cost estimate.

5. Sheathing at the exterior closure of the operation building needs

to be added.

6. The estimate contains the use of Romex cables, whereas the design calls for MC cables.

7. The cost of the water well is in the cost estimate. The VE team understands that to be an existing system.

8. The estimate contains a motor control center, which is not required.

9. The cost estimate identified 18 outdoor security cameras. The drawings show only six cameras.

Design Suggestion

VALUE ENGINEERING STUDY REPORT

POPLAR ISLAND OPERATIONS BUILDINGS

Agenda

Prior to the workshop

Team reviews documents

Monday – 3 March 03 – at Poplar Island

7:00 am Carpool leaves from PMSI

9:30 am Departure from Lowes Wharf for site visit to Poplar Island

Thursday – 6 March 03 - at Baltimore

8:00 am Carpool leaves from PMSI

9:30 am Briefing by design team, at CCB Baltimore, Rm 6500

1:00 pm Establish workshop objectives

1:15 pm Review cost models

1:30 pm Function analysis

2:00 pm Brainstorming of ideas by function

Friday – 7 March 03 - at PMSI

8:30 am Detailed idea evaluation
- Establish criteria
- Function/cost/implementation probability

10:00 am Assign proposal development tasks and develop proposals
- Worksheets, sketches, design calculations
- Initial and life-cycle costs
- Internet research
- CD ROM Research

Monday – 17 March 03

Noon Report in hands of reviewers

Tuesday – 25 Mar 03

9:30 am Presentation and implementation meeting at CCB Baltimore in Rm. 10220

VALUE ENGINEERING STUDY REPORT

OPERATIONS BUILDINGS
POPLAR ISLAND

Contact Directory

Designer's Briefing – 06 March 03

Value Engineering Team:

US Army Corps of Engineers:	
John Vogel	410-962-4408
Project Management Services, Inc.:	
Benson Kwong, Team Leader, Mechanical	301-340-0527
James Freehof, Architect	301-340-0527
George Gerber, Civil	301-340-0527
Monte Richards, Electrical	301-340-0527

Owner, User and Designer Representatives:

US Army Corps of Engineers:	
Jeff McKee, Project Manager	410-962-3455
Joellyn W. Mastyn, Architect	410-962-6678
Ben Wible, Site	410-962-6713
Justly Varghese, Electrical	410-962-2428
Bill Bonenbergor, Mechanical	410-962-6709
Joseph Miklusak, Environmental	410-962-6705
Chuck Frey	410-962-5663
Tom Myrah	410-962-6757
Maryland Environmental Service:	
Dave Wells	410-974-7254
Doug Taylor	410-370-7715
Robert Trageser	410-370-5492
Maryland Port Administration:	
Dave Bibo, Administrator	410-631-1102

VALUE ENGINEERING STUDY REPORT

OPERATIONS BUILDINGS
POPLAR ISLAND

Documents Provided

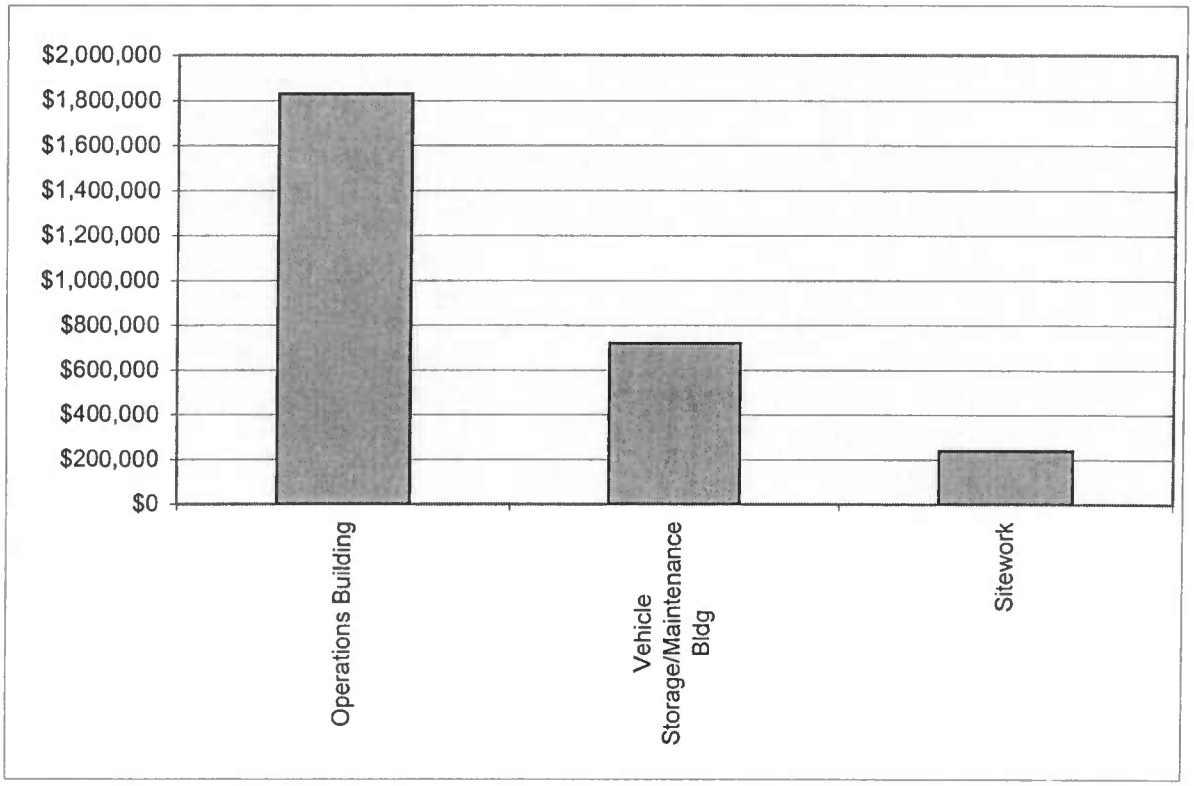
The following documents were provided to the VE team for review prior to the start of the workshop:

- Design documents - Operation, Maintenance & Storage Buildings, Poplar Island Habitat Restoration, developed by USACE Baltimore District.
- Drawings – Operations Buildings, Poplar Island Habitat Restoration, developed by USACE, Baltimore District, dated Aug 2002. Updated architectural and mechanical drawings provided to the team during the workshop.
- Cost Estimate, Administration Building, Poplar Island, Maryland, dated 10 July 2002.
- "Restoring Poplar Island – A National Model for Beneficial Use of Dredged Material," by U.S. Army Corps of Engineer, Baltimore District, 2002 brochure.

PMSI

Operation Buildings
Poplar Island, MD
Summary Cost Model

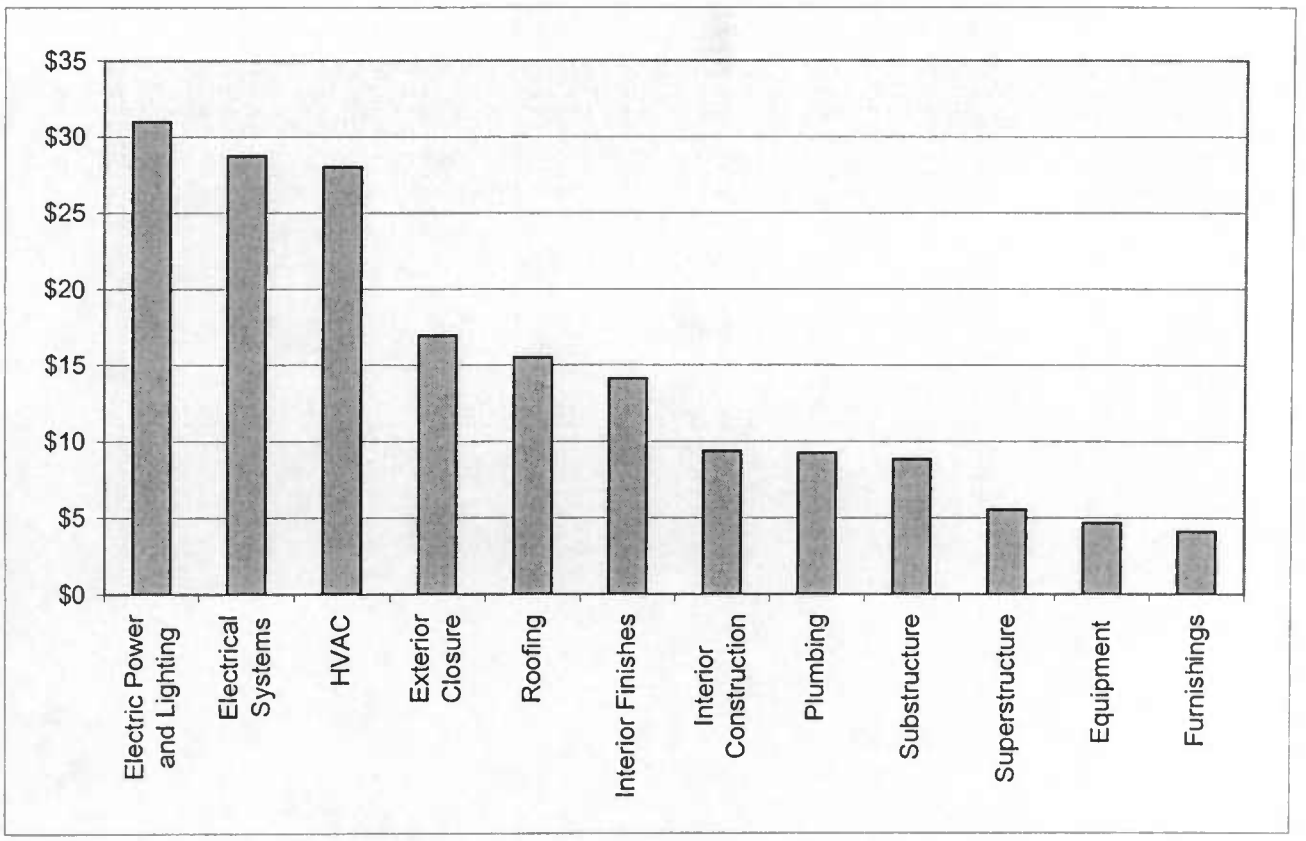
System	Direct Cost	Construction Cost
Operations Building	$1,417,452	$1,831,165
Vehicle Storage/Maintenance Bldg	$558,188	$721,107
Sitework	$186,059	$240,364
	$2,161,699	$2,792,636



PMSI

Operation Buildings
Poplar Island, MD
Operations Building Cost Model

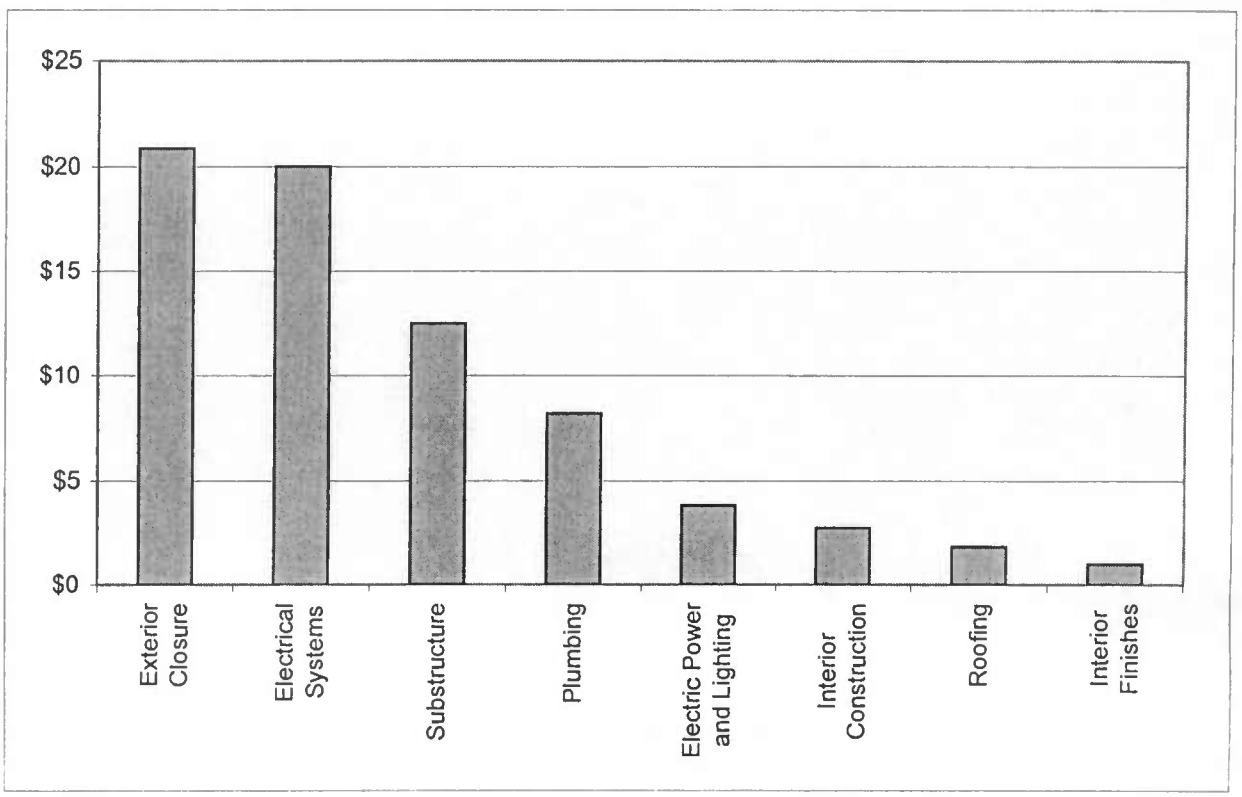
System	Direct Cost	Construction Cost	Cost/SF
Electric Power and Lighting	$249,513	$322,339	$30.99
Electrical Systems	$231,467	$299,025	$28.75
HVAC	$225,471	$291,279	$28.01
Exterior Closure	$136,275	$176,050	$16.93
Roofing	$124,831	$161,266	$15.51
Interior Finishes	$113,604	$146,762	$14.11
Interior Construction	$75,420	$97,433	$9.37
Plumbing	$74,511	$96,259	$9.26
Substructure	$71,152	$91,919	$8.84
Superstructure	$44,597	$57,614	$5.54
Equipment	$37,597	$48,570	$4.67
Furnishings	$33,014	$42,650	$4.10
	$1,417,452	$1,831,165	$176



PMSI

Operation Buildings
Poplar Island, MD
Vehicle Storage/Maintenance Bldg Cost Model

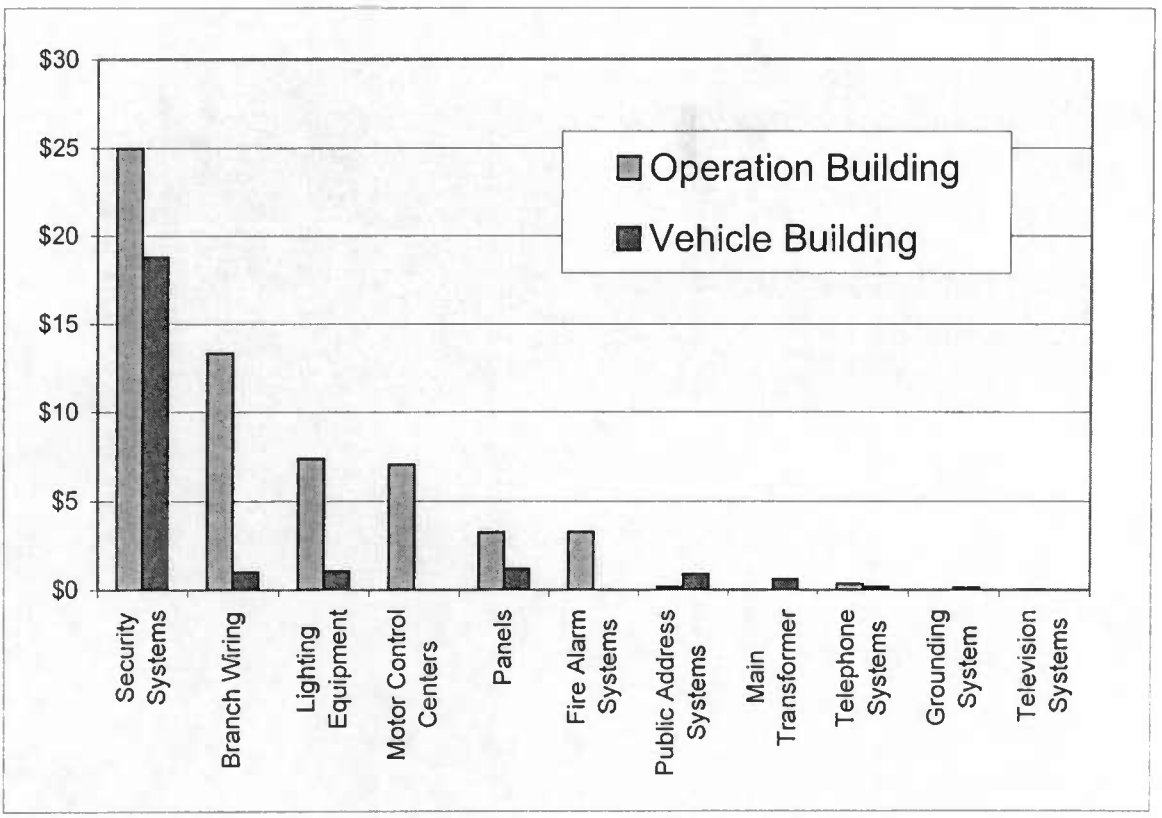
System	Direct Cost	Construction Cost	Cost/SF
Exterior Closure	$164,320	$212,280	$20.88
Electrical Systems	$157,539	$203,520	$20.02
Substructure	$98,328	$127,027	$12.50
Plumbing	$64,453	$83,265	$8.19
Electric Power and Lighting	$30,168	$38,973	$3.83
Interior Construction	$21,642	$27,959	$2.75
Roofing	$14,082	$18,192	$1.79
Interior Finishes	$7,655	$9,889	$0.97
	$558,187	$721,105	$70.94



PMSI

Operation Buildings
Poplar Island, MD
Electrical Cost Model

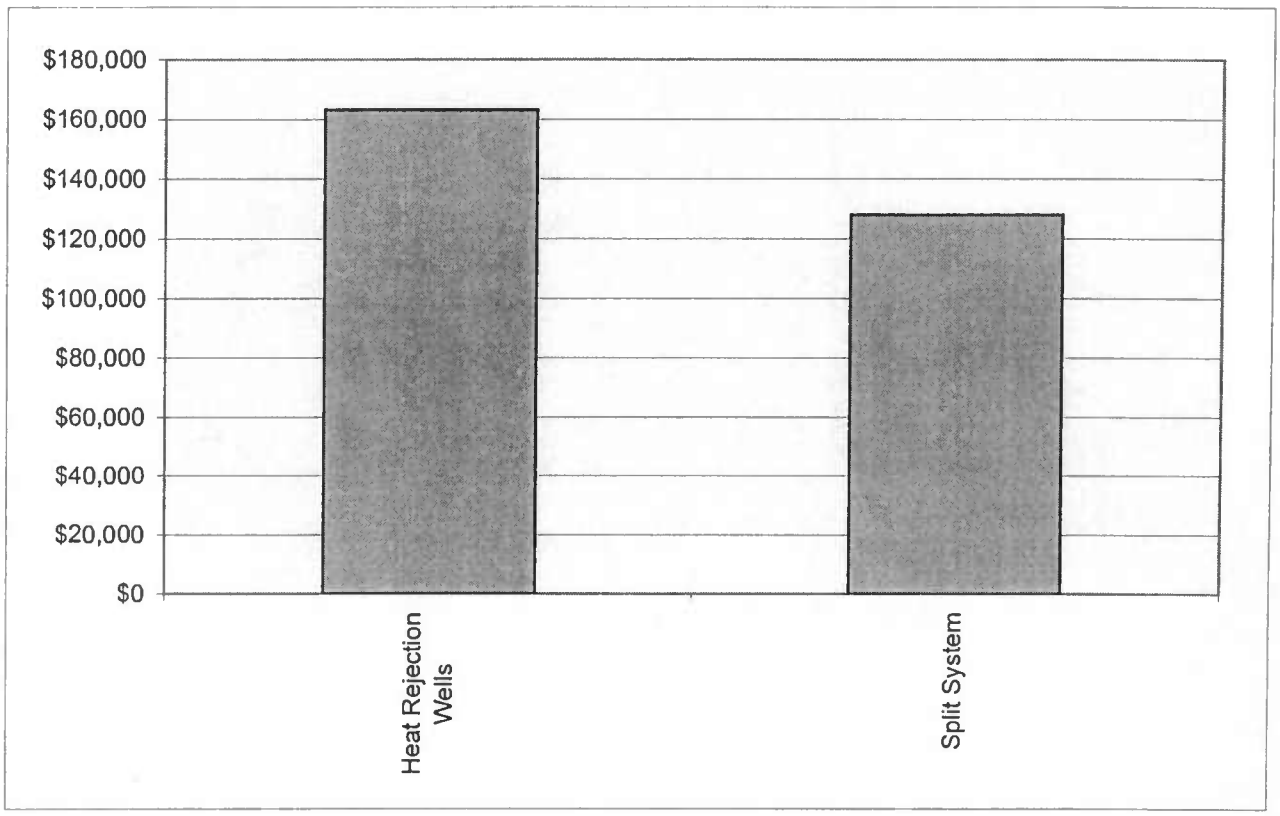
System	Operation Building Construction Cost	Cost/SF	Vehicle Building Construction Cost	Cost /SF
Security Systems	$259,758	$24.98	$191,048	$18.79
Branch Wiring	$138,627	$13.33	$10,123	$1.00
Lighting Equipment	$76,744	$7.38	$10,738	$1.06
Motor Control Centers	$73,306	$7.05	$0	$0.00
Panels	$33,662	$3.24	$11,996	$1.18
Fire Alarm Systems	$33,706	$3.24	$0	$0.00
Public Address Systems	$1,850	$0.18	$9,082	$0.89
Main Transformer			$6,116	$0.60
Telephone Systems	$3,541	$0.34	$1,965	$0.19
Grounding System			$1,426	$0.14
Television Systems	$171	$0.02	$0	$0.00
	$621,364	$59.75	$242,494	$23.86



PMSI

Operation Buildings
Poplar Island, MD
Operation Building HVAC Cost Model

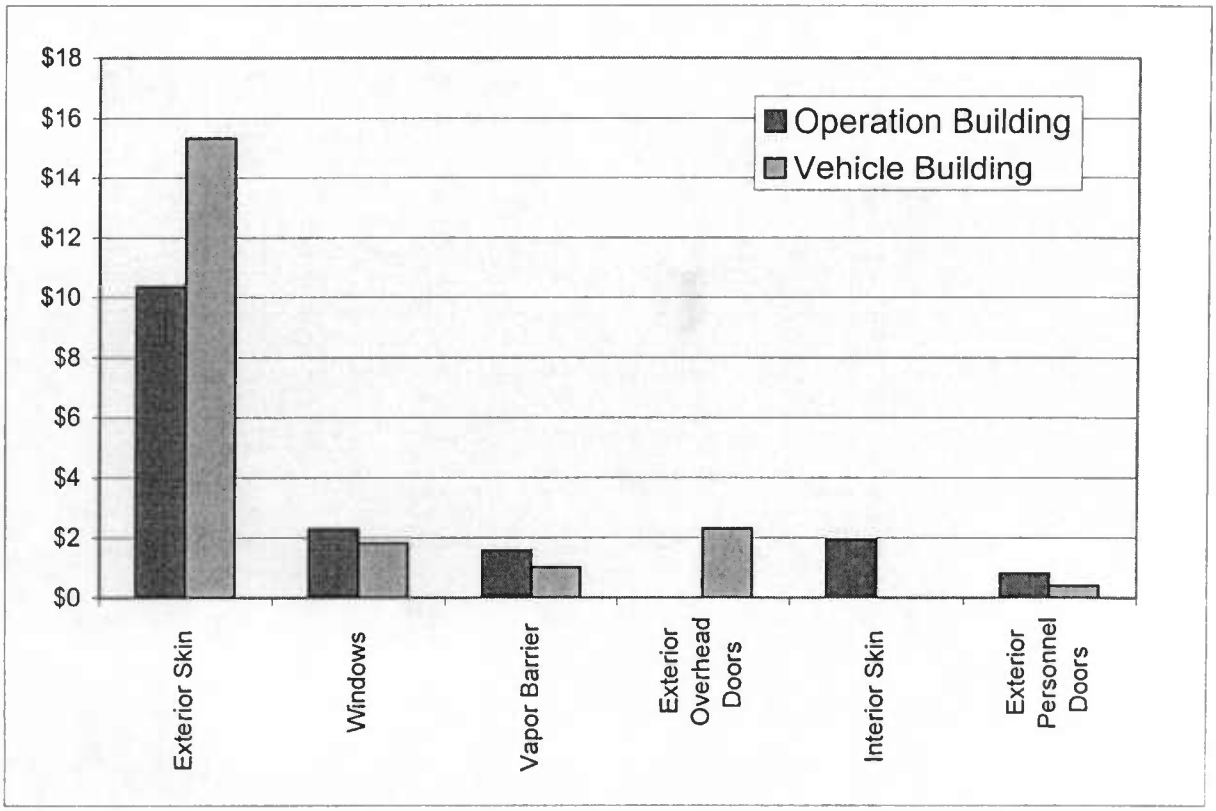
System	Direct Cost	Construction Cost
Heat Rejection Wells	$126,343	$163,219
Split System	$99,128	$128,061
	$225,471	$291,279



PMSI

Operation Buildings
Poplar Island, MD
Exterior Closure Cost Model

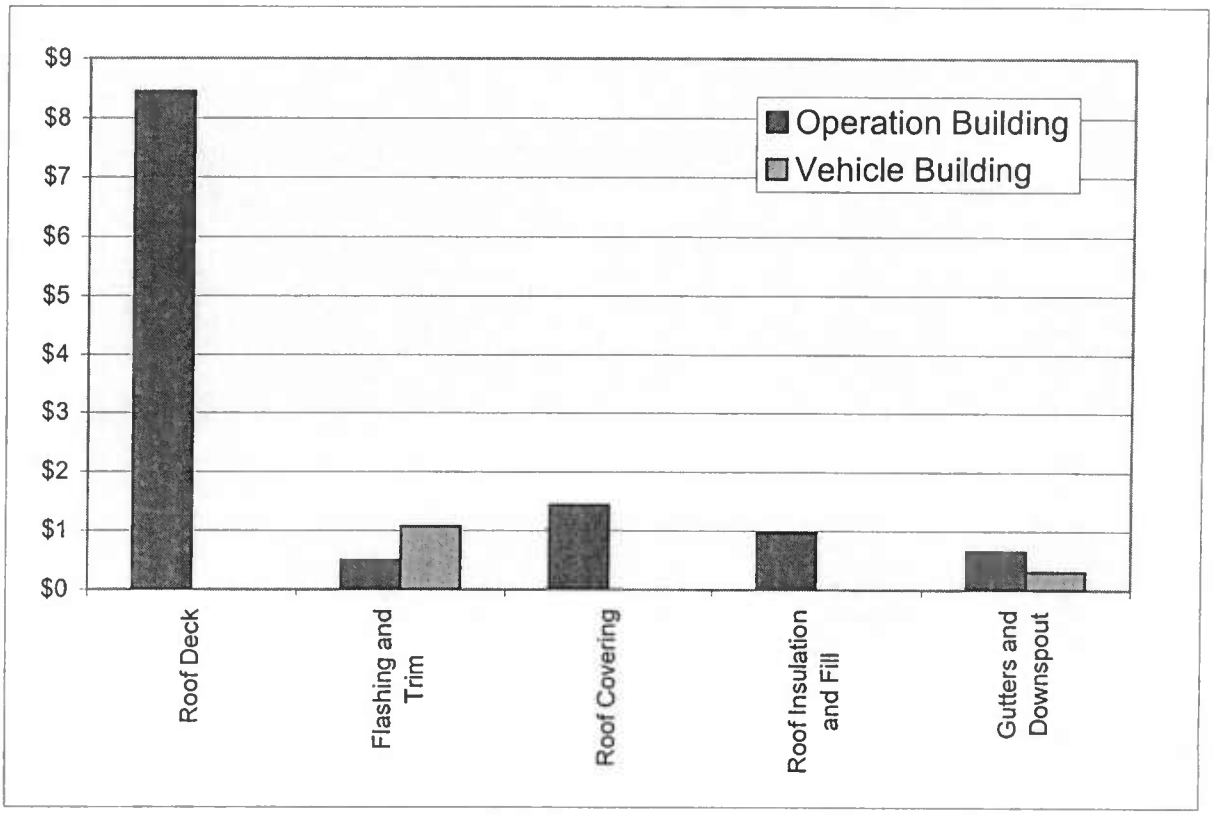
System	Operation Building Construction Cost	Cost/SF	Vehicle Building Construction Cost	Cost /SF
Exterior Skin	$107,672	$10.35	$156,010	$15.35
Windows	$23,464	$2.26	$18,578	$1.83
Vapor Barrier	$16,460	$1.58	$10,369	$1.02
Exterior Overhead Doors	$0	$0.00	$23,322	$2.29
Interior Skin	$20,202	$1.94	$0	$0.00
Exterior Personnel Doors	$8,251	$0.79	$4,002	$0.39
	$176,050	$16.93	$212,282	$20.88



PMSI

Operation Buildings
Poplar Island, MD
Roofing Cost Model

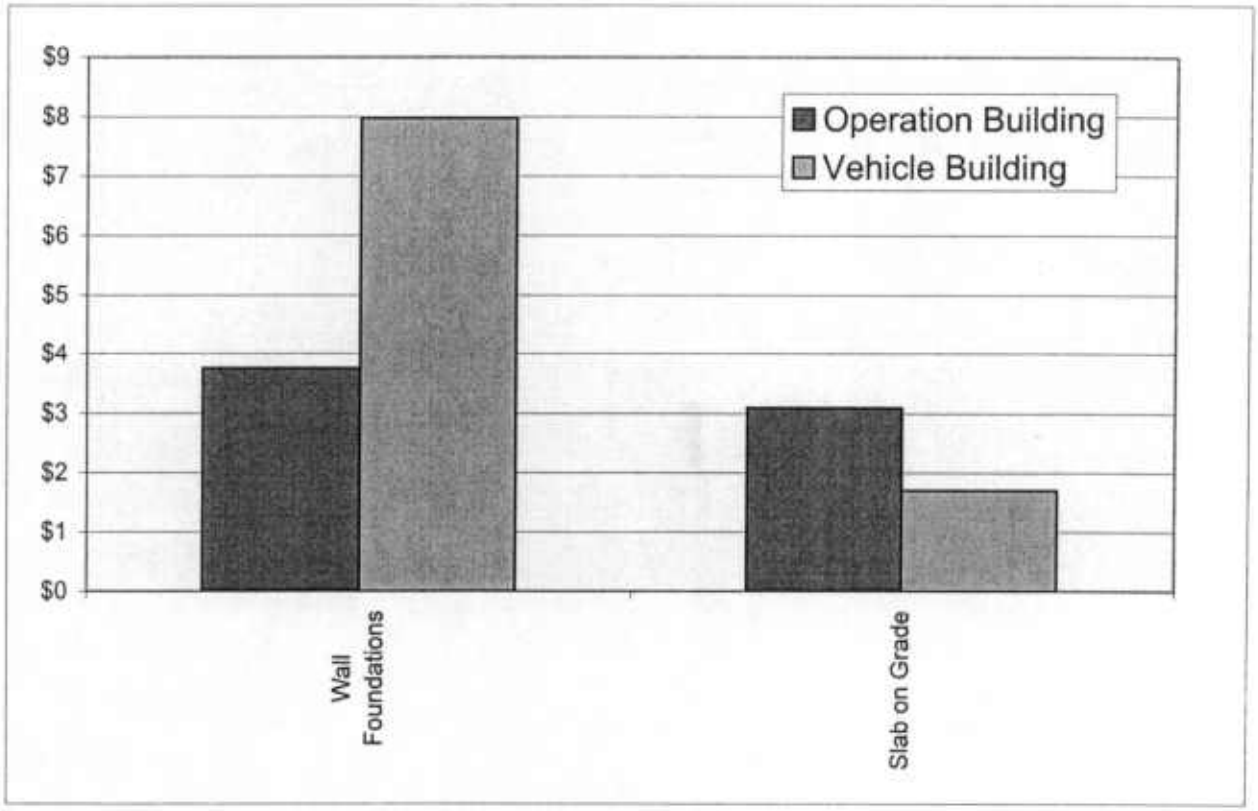
System	Operation Building Construction Cost	Cost/SF	Vehicle Building Construction Cost	Cost /SF
Roof Deck	$87,856	$8.45	$0	$0.00
Flashing and Trim	$5,170	$0.50	$10,910	$1.07
Roof Covering	$14,873	$1.43	$0	$0.00
Roof Insulation and Fill	$10,106	$0.97	$0	$0.00
Gutters and Downspout	$6,826	$0.66	$3,172	$0.31
	$124,831	$12.00	$14,082	$1.39



PMSI

Operation Buildings
Poplar Island, MD
Substructure Cost Model

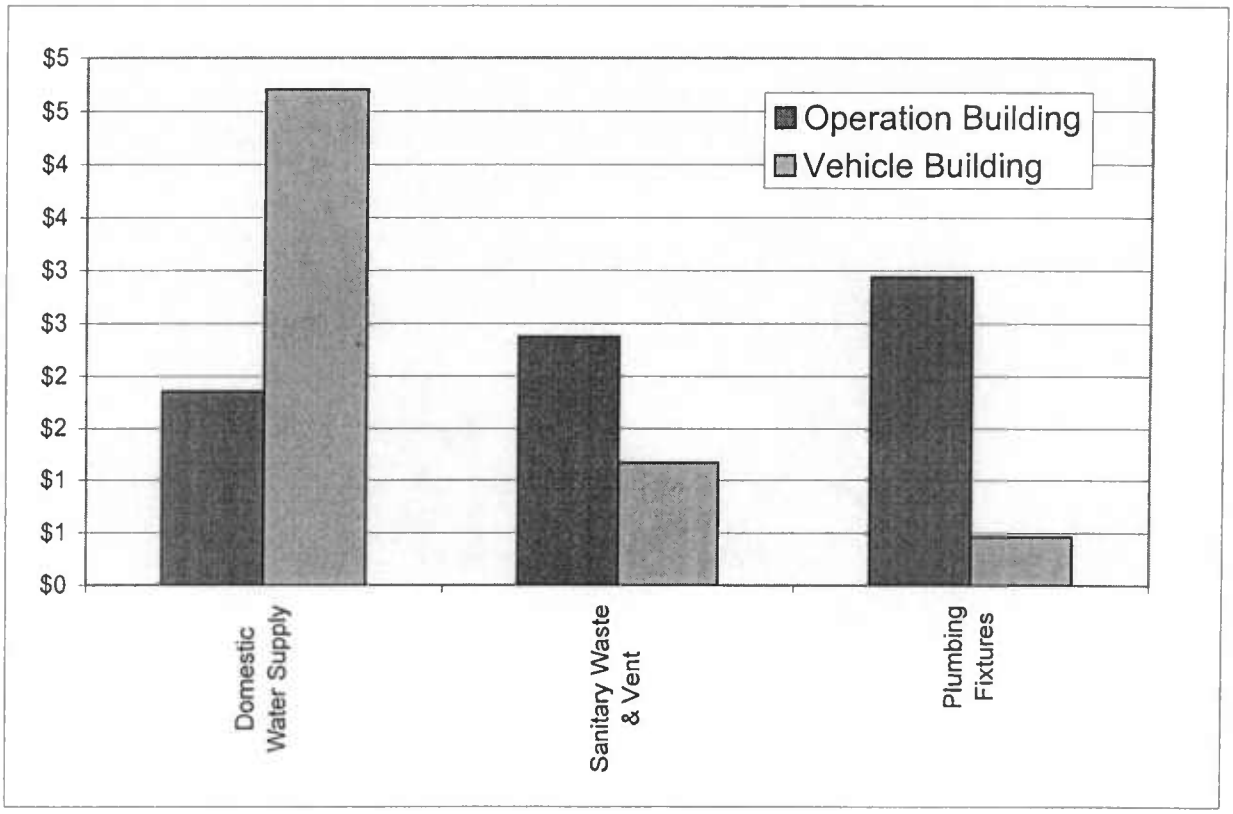
System	Operation Building Construction Cost	Cost/SF	Vehicle Building Construction Cost	Cost /SF
Wall Foundations	$39,019	$3.75	$81,066	$7.98
Slab on Grade	$32,133	$3.09	$17,262	$1.70
	$71,152	$6.84	$98,328	$9.67



PMSI

Operation Buildings
Poplar Island, MD
Plumbing Cost Model

System	Operation Building Construction Cost	Cost/SF	Vehicle Building Construction Cost	Cost /SF
Domestic Water Supply	$19,305	$1.86	$47,851	$4.71
Sanitary Waste & Vent	$24,671	$2.37	$11,898	$1.17
Plumbing Fixtures	$30,535	$2.94	$4,704	$0.46
	$74,511	$7.16	$64,453	$6.34



VALUE ENGINEERING STUDY REPORT

OPERATIONS BUILDINGS
POPLAR ISLAND

Function Analysis

Cost Element	Function	
	Verb	**Noun**
Operations Building:		
- Offices	House	People
- Second Floor	Impress	Visitors
- Lab	Monitor	Environment
- Locker & Shower	Demud	Personnel
- HVAC	Control	Environment
- Structure	Support	Load
Vehicle Maintenance Building:		
	Repair	Vehicles
	Service	Vehicles
	Weld	Parts
Storage Building:		
	Treat	Water
	Store	Vehicle
	Store	Equipment
	Store	Supplies
	Store	Oil
	Cut	Weir Boards
Site Work:		
- Ground Source Wells	Transfer	Heat
- Pavement	Keep away	Mud
- Mechanical Utilities	Distribute	Water/Sewage
- Sewage	Treat	Waste
- Oil separator	Separate	Oil
- Parking	Park	Cars
- Bollards	Protect	Structure

VALUE ENGINEERING STUDY REPORT

OPERATIONS BUILDINGS
POPLAR ISLAND

Economic Data

Energy Costs:

Power: (Calculated from January 2003 electric bill & Conectiv's published rates)
On Peak: $0.045 / kWh
Off Peak: $0.035 / kWh
Average rate: $0.04 / kWh
Winter demand charge $7.13 /kW
Summer demand charge: $9.52 /kW

Diesel Oil: $2.00 per gallon

Present Value Factors:

Economic Life: 25 years

Based on 2002 discount rates for OMB Circular No. A-94

Real Discount Rate: 3.9%

VPV Factors (annual cost multiplier): 15.79

Mark-ups:

On Subcontractor's cost: 29.19%

Mark-ups consist of:

Field Overhead:	14%
Home Office Overhead:	2%
Contractor's Profit:	10 %
Bond:	1 %
Escalation:	0 %
Design Contingency:	0 %

VALUE ENGINEERING STUDY

IDEA LISTING AND EVALUATION

Discipline	*Number*	*Idea*	*Advantages:*	*Disadvantages:*	*Rating*
A	01	Delete masonry veneer. Use metal/precast panels.			8
			Reduces on-site labor.	Different look.	
A	02	Eliminate pavers on roof. Use "TREX."			9
			Reduces on-site labor. Reduce roof load.	None apparent.	
A	03	Designate areas for observation.			9
			Reduces cost. Avoid conflict with exhaust	Less space for visiting group.	
A	04	Make single story building use video to view island.			7
			Reduces cost.	Eliminates viewing deck function.	
A	05	Eliminate parapet, provide railing.			8
			Improves view. Reduces cost.	None apparent.	
A	06	Use sheathing over wood stud.			2
			Corrects detail.	None apparent.	
A	07	Reduce height of storage structure.			9
			Reduces cost.	None apparent.	
A	08	Co-house water treatment and generator,			8
			Reduces utility runs.	Requires additional structure.	
A	09	Use only one overhead door in storage building.			3
			Reduces cost.	Makes moving in and out of building difficult.	
A	10	Reduce height of operation building.			See A-32
			Reduces cost.	None apparent.	
A	11	Recognize need for crane.			DS
			Provides needed function.	None apparent.	

VALUE ENGINEERING STUDY

IDEA LISTING AND EVALUATION

Discipline	*Number*	*Idea*	*Advantages:*	*Disadvantages:*	*Rating*
A	12	Use ultrasonic pest control.			1
			Gets rid of mice.	Effectiveness not proven.	
A	13	Build rectangular building with balconies.			3
			Eliminates roof deck.	Mixes visitors with employees.	
A	14	Build rectangular 2 stories building with observation on roof.			3
			Simplifies structure.	Mixes visitors with employees.	
A	15	Delete gutters and downspouts.			6
			Reduces cost.	No control of rain water drainage.	
A	16	Use shingles roof.			4
			Reduces cost.	Not suitable for wind load.	
A	17	Eliminate double masonry wall between buildings.			8
			Reduces cost.	None apparent.	
A	18	Combine VMF and storage buildings.			3
			Reduces wall.	Buildings are of different heights and temperatures.	
A	19	Delete ceiling in upper conference room.			2
			Reduces cost.	Not aesthetically pleasing.	
A	20	Delete ceilings everywhere.			2
			Reduces cost.	Not aesthetically pleasing.	
A	21	Interchange storage and maintenance building.			See A-8
			Reduces length of water line.	Requires redesign.	
A	22	Reduce number of lockers.			5
			Reduces cost.	Less lockers for employees.	

VALUE ENGINEERING STUDY

IDEA LISTING AND EVALUATION

Discipline	*Number*	*Idea*	*Advantages:*	*Disadvantages:*	*Rating*
A	23	Revise thickness shown for roof insulation.			1
			Corrects detail.	None apparent.	
A	24	Use metal siding on operation building.			2
			Reduces cost.	Less durable.	
A	25	Keep trailers for operation building.			1
			Eliminates building.	Not appropriate for long term operation.	
A	26	Combine all buildings under one roof.			1
			Reduces cost.	Buildings are of different constructions.	
A	27	Reduce width of stair #2.			6
			Reduces cost.	Requires redesign.	
A	28	Reduce observation deck size.			See A-3
			Reduces cost. Avoid conflicts with exhaust.	Less space for visiting group.	
A	29	Reduce canopies at entrances.			7
			Reduces cost.	None apparent.	
A	30	Aim for spirit bronze certification.			DS
			Meets Army requirement. Showcase project.	Could cost more.	
A	31	Rotate storage building roof 90 degrees.			6
			Allow building height reduction.	Requires redesign.	
A	32	Reduce default ceiling height to 8'.			9
			Reduces cost.	None apparent.	
A	33	Use sand berm.			5
			Alternate look.	Requires maintenance.	

VALUE ENGINEERING STUDY

IDEA LISTING AND EVALUATION

Discipline	*Number*	*Idea*	*Advantages:*	*Disadvantages:*	*Rating*
A	34	Increase size of windows in maintenance and storage building.	Increases daylighting.	Increases UV radiation.	2
A	35	Delete windows from storage building.	Reduces cost.	Reduces daylighting.	7
A	36	Eliminate masonry from storage and maintenance building.	Reduces cost. Simplifies construction.	Different look.	8
A	37	Use VCT in lieu of carpets.	Facilitates maintenance. Reduces cost.	Less comfortable.	7
A	38	Eliminate vinyl wall coverings.	Reduces cost.	Lowers finish grade.	6
A	39	Provide live exhibits support in upper conference room.	Enhances visitors' experience.	Beyond project scope.	2
A	40	Use walkable roof in lieu of pedestals and pavers.	Simplifies construction.	Solution not proven.	3
C	01	Review structural design load.	Improves design.	None apparent.	DS
C	02	Delete bollards use bumper blocks.	Reduces cost.	Does not stop vehicles.	6
C	03	Use preassembled wood components.	Reduces on-site labor.	Options determined by contractor.	5
C	04	Use precast grade beams and footing in lieu of foundation walls.	Reduces on-site labor.	More difficult to level.	6

VALUE ENGINEERING STUDY

IDEA LISTING AND EVALUATION

Discipline	*Number*	*Idea*	*Advantages:*	*Disadvantages:*	*Rating*
C	05	Eliminate steel column/beam brick support.			2
			Eliminates structural steel.	Cannot be done independently.	
C	06	Eliminate CMU/wall stud from water treatment room.			6
			Reduces cost.	Not sure what it means.	
C	07	Delete concrete sidewalk.			1
			Reduces cost.	Sidewalk can become muddy.	
C	08	Design septic field for 50 visitors.			2
			Meet occupant load.	May increase cost.	
C	09	Add landscaping.			2
			Beautify site.	Increases cost.	
C	10	Eliminate front concrete sidewalk east of main entry.			8
			Reduces cost.	None apparent.	
E	01	Develop an electrical master plan.			DS
			Coordinate present and future design.	None apparent.	
E	02	Use romex cables.			10
			Reduces cost.	Higher risk of damage.	
E	03	Use 277V lighting.			7
			More energy efficient	Requires separate panels.	
E	04	Eliminate CCTV system.			10
			Reduces cost.	Reduces security.	
E	05	Provide generator for life safety only.			DS
			Prevents need for new generator.	New generator not in project.	
E	06	Sponsor wave energy demonstration project.			2
			Improves visitor experience.	Not in scope of project.	

VALUE ENGINEERING STUDY

IDEA LISTING AND EVALUATION

Discipline	*Number*	*Idea*	*Advantages:*	*Disadvantages:*	*Rating*
E	07	Install solar power.			1
			Improves visitor experience.	Requires maintenance.	
E	08	Use wind power.			1
			Improves visitor experience.	May interfere with wildlife.	
E	09	Use occupancy sensors.			8
			Saves energy.	Increases cost.	
M	01	Use radiant heaters in vehicle maintenance building.			3
			Saves energy.	May not be the appropriate application.	
M	02	Use electric heat, delete heat pump.			8
			Reduces cost.	Increases energy cost.	
M	03	Use fuel heating, delete heat pump.			9
			Reduces cost.	Requires diesel fuel.	
M	04	Use heat pump in lieu of VAV box.			7
			Reduces energy cost.	Increases cost.	
M	05	Reduce number of thermostats.			2
			Reduces cost.	Less individual control.	
M	06	Delete water softening.			2
			Reduces water treatment cost.	Causes stains in fixtures/pipe.	
M	07	Use non-potable water in WC and shower.			1
			Reduces water treatment requirement.	Not hygienic for shower.	
M	08	Eliminate siamese truck fill on front of maintenance building.			7
			Reduces cost.	No fresh water filling capacity.	

VALUE ENGINEERING STUDY

IDEA LISTING AND EVALUATION

Discipline	*Number*	*Idea*	*Advantages:*	*Disadvantages:*	*Rating*
M	09	Combine intake louvers in maintenance building.			7
			Reduces cost.	None apparent.	
M	10	Relocate exhaust away from observation deck.			See A-3
			Eliminates exposures to odor/chemical	None apparent.	
PM	01	Review the cost estimate.			DS
			Improves estimate.	None apparent.	
PM	02	Allow contractor to use owner's equipment for short term rental.			1
			Reduces contractor overhead.	Requires coordination.	